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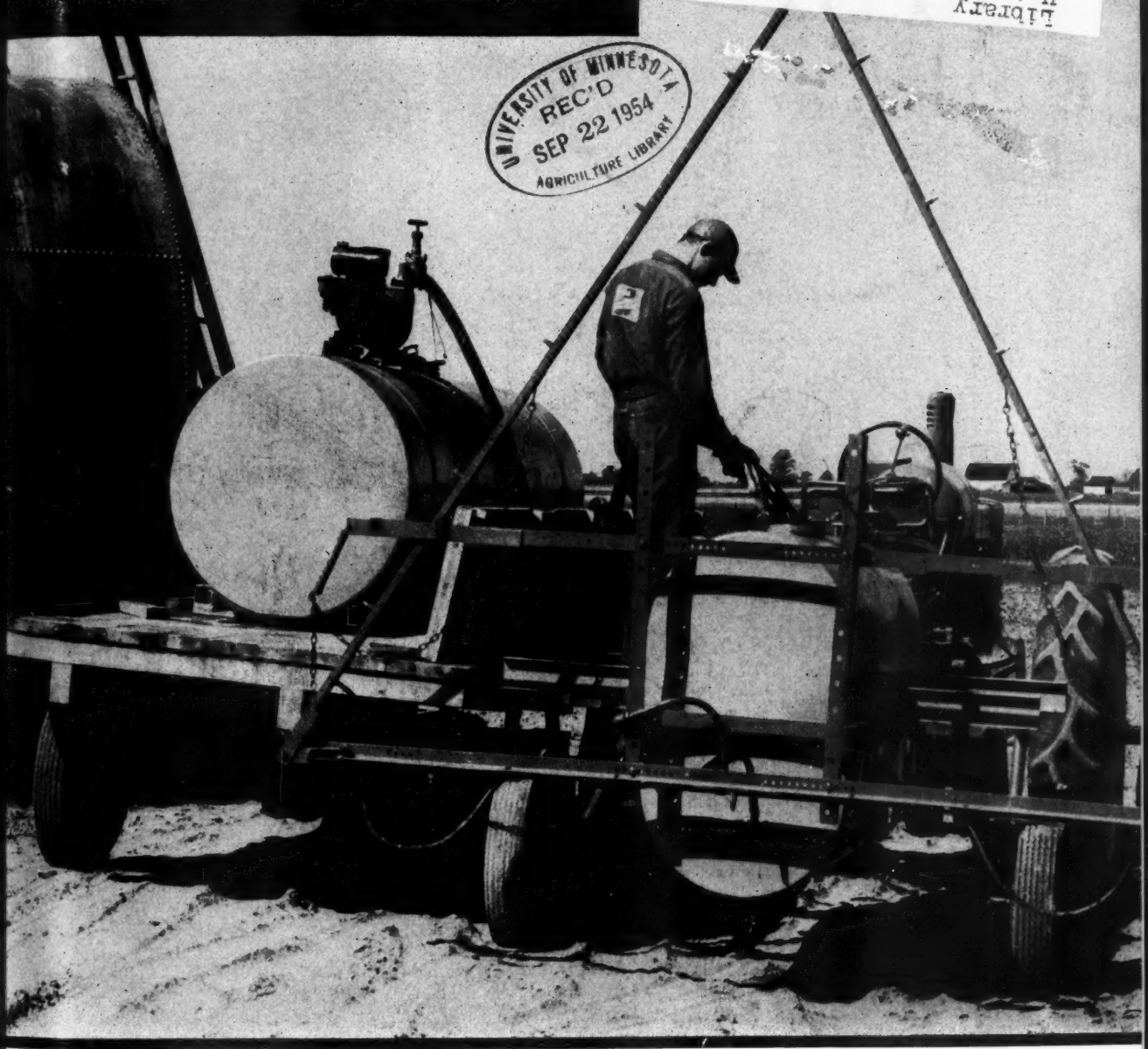

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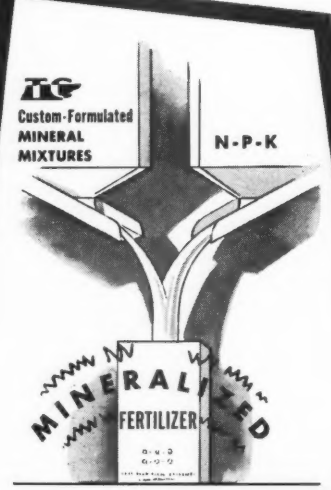

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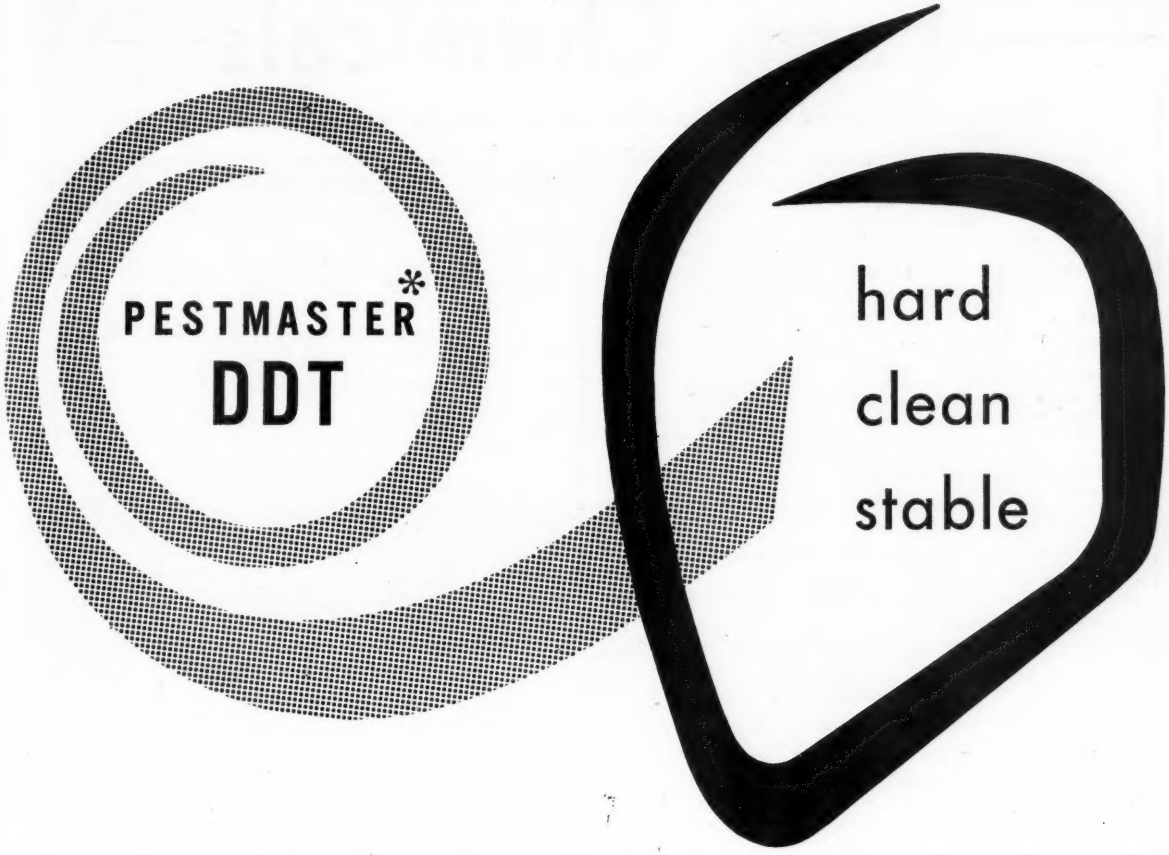

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Cover Story

Three steps in nitrogen solution transfer are illustrated by Bob Dye, Vincennes, Ind. Dye fills a no-pressure tractor drawn rig with 32 foot boom from truck mounted nurse tank which is serviced from a storage tank at distributor installation.

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In this issue . . .

With the Miller Bill a reality and pesticide tolerances in sight, we are especially pleased to include in this issue a guest editorial concerning this important legislation by NAC executive, Lea Hitchner. See page 21 for his remarks.

An excellent program has been arranged by NAC for this month's Spring Lake, N. J., convention. Programs emphasizing public health, the Miller bill, miracle drugs and other important subjects are on the agenda. Pages 26–27 offer a complete report.

At the NAC meeting last fall, a pesticide-fertilizer mixtures discussion was of special interest. Beginning on page 26 we include a special report on these materials including current views of the 1953 panelists. There is also a tabular summary of current state regulations concerning these products, based on material gathered by Rodney C. Berry, Virginia state chemist.

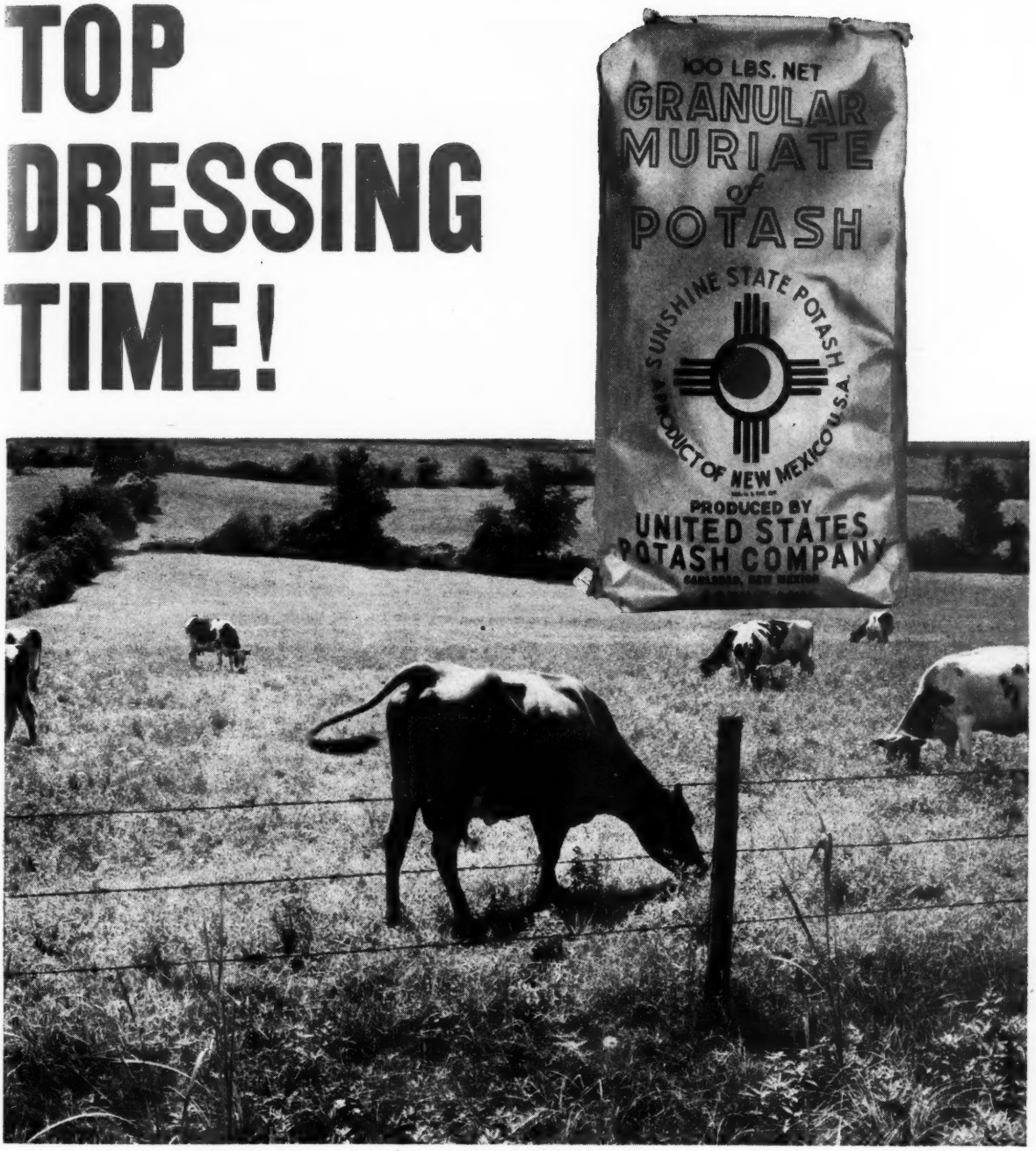
An I&C bagger installed in February at Dixie Guano co. has been doing an excellent job as reported in the short article on page 34 by Dick Brown. Dixie has added a vibrator for better feeding.

Grain sanitation is in the news again and our Washington reporter John Harms reports on the current situation as part of the article beginning on page 36. He has dug out some information from the secretive report now under review in the capitol. Supplementing this are statements by several leading government and industry representatives on the grain sanitation program.

USDA researchers Fox, Hardesty and Kumagai report on plant scale tests with both anionic and nonionic surface active agents in the production of superphosphate and mixed goods. For a brief description of the results see page 43.

A Do-It-Yourself plan is gaining in popularity among dealers in nitrogen solutions. Evolved by W. A. Senesac, many operators are now using the plan and report very favorably on the results obtained through lending applicator rigs to farmers. See page 50.

TOP DRESSING TIME!



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Fairfield Chemical Division Plant, Baltimore, Md.

Pyrenone* under New ownership

As of September 1, 1954, the insecticide business of U. S. Industrial Chemicals Co. Division of National Distillers Products Corp., has been purchased by Food Machinery and Chemical Corporation. Included in this transfer of operations are U.S.I. laboratories and manufacturing facilities in the Fairfield industrial section of Baltimore, Md.

Effective the same date, Food Machinery established the Fairfield Chemical Division as a completely separate division to manufacture and sell insecticide materials and other diversified chemicals.

Operations of the Fairfield Chemical Division of Food Machinery and Chemical Corporation will continue to be handled by the experienced people who have been identified with the operations of the insecticide division of U.S.I. No changes in policy or basic procedure are contemplated now or in the future. The Fairfield Chemical Division will continue to serve customers of Pyrenone, and related products, as they have been served in the past by U.S.I.

Headquarters sales offices of Fairfield Chemical Division will be in the Graybar Building, 420 Lexington Ave., New York 17, N. Y. Branch offices will be located in Chicago, Kansas City, San Francisco, New Orleans, and other strategic points.

Both Food Machinery and National Distillers are cooperating to make certain that the transition of ownership of insecticide operations causes a minimum of inconvenience to customers.

Reg. U.S. Pat. Off., F.M.C.

FAIRFIELD CHEMICAL DIVISION

FOOD MACHINERY AND CHEMICAL CORPORATION

420 Lexington Avenue **New York 17, N. Y.**

INDUSTRY News

Open N Div. Plant, Expansion Slated

Aerial view of Nitrogen div., Allied Chem. & Dye corp.'s Omaha plant.

Just as announcement was made of initial urea production at Nitrogen div.'s new Omaha, Neb., plant, Hugo Riemer, division president, released plans calling for the doubling of ammonia capacity at this location. Construction will begin as soon as a supply of natural gas has been assured.

Present ammonia and urea facilities incorporate Allied Chemical's own processes and were engineered and constructed by Catalytic Construction co., Philadelphia. Natural gas reforming facilities were installed by The Girdler co., Louisville, Ky.

About 2,000 Catalytic construction workers were employed on the project which utilized 2,300 tons of structural steel in the 14 major and 10 minor buildings, along with 100 miles of electric wiring and miles of pipe.

The nitrogen plant, first in the north-central area, is designed to produce and ship over 100,000 tons of products per year.

Northern Natural Gas co. now supplies natural gas to the Omaha facilities and has made application to the Federal Power Commission to increase the quantity. Approval is anticipated in view of the present and prospective reserves and pipe line capacity of Northern and importance of the Omaha plant.

V-C Begins Ky. Operation

Virginia-Carolina Chemical corp. has formally opened its new sales office and fertilizer plant in Hopkinsville, Ky., according to an announcement by C. Cecil Arledge, vice president.

These facilities, formerly operated as the Cumberland Chemical co., were purchased by V-C in June.

Concurrently, Arledge announced the opening of new sales facilities at Fort Wayne, Ind., where Virginia-Carolina has operated fertilizer manufacturing facilities since 1915. C. H. Godfrey has been named manager of the sales office, and J. N. Stone, assistant to the manager.

Dave S. King has been named manager of the Hopkinsville office, and Al C. Rutland, superintendent of the factory.

New Farm Bureau Plant

Plans for construction of a new $750,000 fertilizer manufacturing plant near Mt. Gilead, O., have been announced by the Farm Bureau Cooperative Association, Columbus.

According to Wayne H. Shidaker, vice president-operations, construction will begin immediately on a site seven miles north of Mt. Gilead.

Capacity of the plant, which will be designed and built by A. J. Sackett & Sons, is expected to be 70,000 tons of granulated fertilizer annually. Completion is scheduled for July, 1955.

Geigy Building New Ia. Plants and Office

A $500,000 formulating plant and sales office is being built at Des Moines, Ia., by Geigy Agricultural Chemicals, div. of Geigy Chemical corp. Contractor is Weitz co. of Des Moines.

The new installation, which will replace the company's Midwest territorial headquarters at Burlington and Lockridge, Ia., will service an area from the Rocky Mountains to the Alleghenies. Plans include two formulating plants, one for the manufacture of insecticides and fungicides and the other for herbicides, as well as a sales office incorporating a quality control laboratory.

E. C. Gerdes will continue in charge of Geigy's Midwest branch and Wayne Rorman as plant manager when the Des Moines move is completed.

Constructing C-S Plant

Construction work is underway on an ammonia producing plant at Columbia-Southern Chemical corp.'s chemical manufacturing operation in Natrium, W. Va. Design and construction of the new facility is under the supervision of Chemical Construction co.

The new plant, estimated to cost $3 million, is expected to be in production by April, 1955, according to E. T. Asplundh, company president.

Compressors for the new unit will be housed in a pre-cast concrete building, and the ammonia producing facility will be outside construction.

This plant will mark Columbia-Southern's entry into the ammonia production field.

Larrick Named FDA Head

George P. Larrick, deputy commissioner of Food and Drugs since 1951, has been appointed commissioner, succeeding Charles W. Crawford, who has retired.

First an inspector for FDA in 1923, he has served successively as administrative assistant, senior inspector, chief inspector, assistant commissioner, associate commissioner and deputy commissioner.

Retiring Commissioner Crawford has served more than 37 years with FDA, and for many years devoted much of his time to drafting food and drug regulations and standards.

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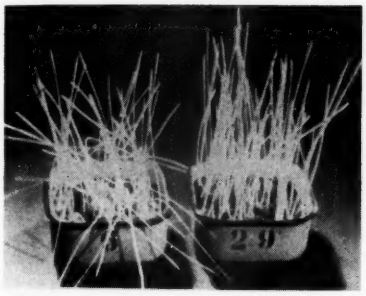
Pratt Co. Moves to Paterson

B. G. Pratt & co. is starting its second 50 years in the insecticide business at a new location, 204 21st Avenue, Paterson, N. J., according to Henry B. Pratt, vice president. During the past half-century the company had been located in Hackensack, N. J.

"We have, literally, been bursting our seams the last few years," stated Pratt. "The new location will give us excellent manufacturing, packaging and warehouse facilities, as well as modern offices."

"Red Seed"



This is a still photograph from the documentary motion picture "Red Seed," produced in an English language version by Panogen, Inc. It shows how treating seed wheat with a liquid disinfectant helps seedlings get a good start. Untreated seed is at left, Panogen-treated seed at right.

Dieldrin OK for Household

USDA recently granted label acceptance for dieldrin's use in households for control of roaches, ants, silverfish, ticks, carpet beetles, paper nest wasps and mud daubers.

"This new acceptance is most important because it opens the way for dieldrin to become a small-package insecticide available on dealer's shelves for everyone's use in home insect control," said R. C. McCurdy, president of Shell Chemical corp. "Also, the acceptance is a testimonial to the safety of dieldrin's use."

Atlantic Ammonia Plant

A synthetic ammonia plant, the first of its type in the area, is now being operated by Atlantic Refining co. at the Philadelphia refinery, the company has announced.

Daily capacity of 100 tons has not as yet been reached. About 40 per cent will be agricultural production, to be sold in Maryland, Delaware, Pennsylvania, New York, New Jersey and New England, and 60 per cent will be industrial production, the company stated.

The unit operates on by-product hydrogen obtained from a petroleum refinery unit. Other companies are said to be considering this type of operation. The new plant completes the third unit in the $50 million modernization portion of Atlantic Refining's capital expenditure program.

Monsanto Begins Acid Unit

Monsanto Chemical co. reports that construction work has been started on a 400-tons-per-day 100 per cent sulfuric acid unit at its William G. Krummrich plant at Monsanto, Ill. The new unit, known as a Leonard-Monsanto contact sulfuric acid plant, is expected to be in production Jan. 1, 1955.

New Potash Import Firm

A new company, The Potash Import & Chemical corp., has been formed to bring muriate and sulfate of potash into Eastern United States port cities from Western Germany.

Officers include Henry Mann, president, and Werner Duehrssen, vice president. Henry Maddux has been named agronomist and Cliff Collier will handle Southeastern sales with headquarters in Atlanta. Main offices will be at 285 Madison Avenue, New York City 17.

Museum Exhibit by Swift

The importance of proper conditioning of soil for food production is featured in the new nutrition exhibit, "Food for Life," sponsored by Swift & co. at the Museum of Science and Industry in Chicago.

The company installed a lead lined "garden," in which garden and field crops flourish under artificial light in artificially drained and nourished soil.

Guide shows a section of the "Food for Life" exhibit to two visitors.

One section of the exhibit, displayed under a waterfall, illustrates how soil can be rebuilt after it has been depleted by poor farming practices.

The exhibit also presents a time-lapse motion picture, "Two Tomatoes." Filmed in full color, the picture shows what happens when a tomato plant receives all essential nutrients from the soil in contrast to what happens when one or more of the essential nutrients is missing.

National Distillers Ups Fert. Chem. Production

National Distillers Products corp. will increase production of its basic chemicals for the fertilizer industry as part of a realignment of its chemical activities and their consolidation into a new Chemical div., Robert E. Hulse, vice president, recently announced.

The consolidation, which took place officially August 13, reflects the company's decision to emphasize basic industrial chemicals produced by integrated operations and to withdraw from special lines or those in which it has no basic production. It has sold the insecticide, anti-freeze and resin business of U. S. Industrial Chemicals div. USI will be absorbed into the new Chemical div. and will become its sales and distribution organization.

The USI Fairfield, Md., plant at Baltimore was purchased by Food Machinery & Chemical corp., and will be operated by FM & C as a separate division, Fairfield Chemical div., under the general management supervision of J. V. Vernon, president of the Niagara Chemical div. Not included in the sale were methionine, ethyl acetate and esters, ethyl acetoacetate and arylids, ether and ethylene (cylinder). These operations will be continued at Fairfield until National constructs new facilities for these products at other locations.

Products scheduled for a boost in output include sulfuric acid, nitrogen and nitrogen solutions. Hulse said that by the end of the year the company will have a capital investment of $70 million in chemical plants.

National Distillers has authorized Girdler corp. to install natural gas reforming equipment at its Tuscola, Ill., plant to expand ammonia capacity to 60,000 tons per year by mid-1955. New denaturing units are being designed by ND's Engineering dept. for Newark, N. J., and Tuscola, Ill. A new pilot plant building is also being constructed at Cincinnati, O.

TVA Drops Conc. Supers

Tennessee Valley Authority plans to discontinue the production of concentrated superphosphates in 1955, and to devote its energies to the development and introduction of other pioneering types of fertilizer materials, stated Martin E. Weeks, assistant director of TVA's Division of Agricultural Relations.

Weeks spoke at Owatonna, Minn., where he attended a demonstration of a new fertilizer spreader which mixes straight materials and applies them in whatever proportion the crop being fertilized requires.

McIver Vitorganic Agent

Alexander M. McIver & Son have been appointed exclusive sales agents for Vitorganic-Chicago Activated Sludge by Chicago Fertilizer co. This sludge is produced by the Sanitary District of Chicago.

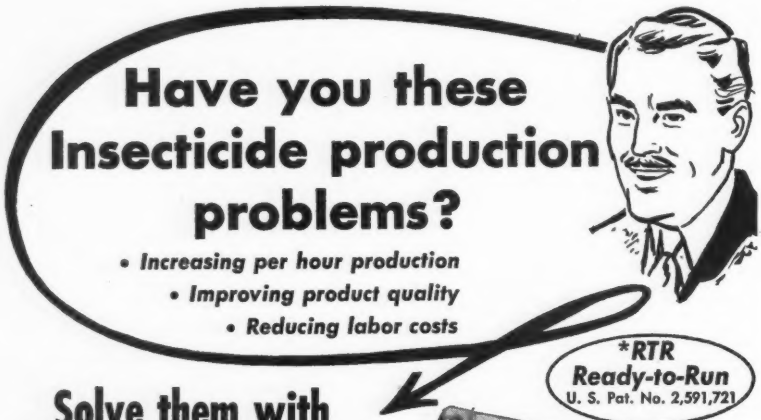
The appointment became effective late in June when Chicago Fertilizer co. was awarded a contract for sale of Chicago Activated Sludge in bulk for the year July 1, 1954 through June 30, 1955.

Venezuela Pesticide Market

U. S. pesticide producers might well find Venezuela an excellent market for insecticides, according to the Department of Commerce. Two Venezuela firms mix about 1,400 metric tons per year, importing all raw materials, 75 per cent of which come from the U. S.

Toxaphene is the principal pesticide formulated, representing 60 per cent of production, followed by DDT, chlordane, aldrin, BHC, parathion, etc.

Demand is not met by the local establishments and the difference is imported as finished products, primarily from this country. Annual consumption of pesticides for agricultural purposes is estimated at 2,490 metric tons with an additional 600 tons for public health and 1,500 for household and industrial use.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NSC Program Set

Industry members who attend the Fertilizer section sessions of the National Safety Congress on Oct. 18 and 19 in Chicago will be given a chance to "stump the experts," as well as hear a number of talks on various phases of safety from industry and state safety personnel.

Speakers include Dr. Chas. W. Nelson, director of research and planning, Industrial Relations Center, University of Chicago, "Reaching the Worker with the Safety Program;" W. C. Creel, safety director, North Carolina Department of Agriculture, "A Small Plant Safety Program That Will Work;" R. R. Murray, safety director, Swift & co., "Visual Aids to Supplement the Small Plant Program" and R. J. Rhinehart, division superintendent, Arkansas Power & Light co., "The Job Ahead."

During both afternoons there will be an experts' panel using whatever time remains to answer problems. Delegates may bring their problems out in the open, and the panel will handle both technical questions and advise on case histories and personnel education.

A Gadget Display showing common hazards and suggested corrections will be presented by John Miskelly, safety director, Mathieson Chemical corp.

Also on the program is a report from General Chairman Vernon Gornto, analyzing the work of the section for the closing year, election of officers and a forecast of work for the section during 1955 by the new chairman.

Control Officials Tour Plant

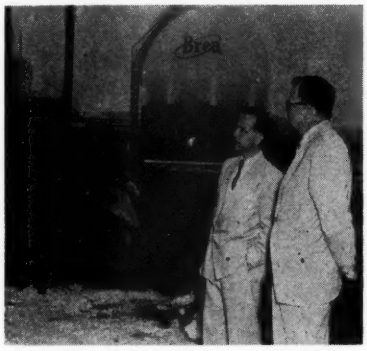
State chemists in charge of fertilizer control in Louisiana, New Mexico, Texas and Oklahoma who attended the Southwestern Fertilizer Conference and Grade Hearing in Galveston, Tex., July 21–23, were escorted through Phillips Chemical co.'s manufacturing facilities at Adams Terminal on the Houston ship channel. Shown are Leo Johnstone, assistant plant superintendent, Adams

Terminal; Dr. E. A. Epps, Louisiana State University; Dr. R. E. Ludwick, New Mexico State College; Park Yeates, Oklahoma City and R. D. Evans, assistant division manager for Phillips Houston sales division.

Work Begins on New Brea NP Solution Plant

Construction has begun on Brea Chemicals' new ammonia phosphate plant at Brea, Calif., according to Homer Reed, company president.

"This marks the second step by Brea Chemicals in the development and distribution of essential plant nutrients in solution form," Reed said. "The new ammonium phosphate solution will be



Jack Tielrooy, manager of development, and Homer Reed, president, observe ground breaking operation.

a stable, non-corrosive liquid that can be safely and easily handled and applied in the same equipment now used for Brea Aqua Ammonia."

Macco corp. is constructing the plant, which is scheduled for completion the latter part of September. Brea expects to have two similar plants in operation at Brawley and Fresno, Calif. early next year.

Totally soluble phosphoric acid, supplied by Monsanto Chemical co., will be blended with Brea Aqua ammonia to form the ammonium phosphate, which will contain 8 per cent nitrogen and 24 per cent phosphate.

NH_3 Sales Show Gain

Anhydrous ammonia sales for direct application rose 34 per cent during the first five months of 1954, as compared with the corresponding period last year, according to an Agricultural Ammonia Institute survey. Reports from 15 distributors, whose tonnage represented approximately 10 per cent of this country's direct application sales in 52-53, were compiled by the institute in computing the increased percentage.

Only one reported a decrease during the period, citing a drought as the reason for the decline. The largest increase noted was 50 per cent.

Build Shell Ammonia Units

Construction of ammonia storage facilities for Shell Chemical corp. has begun at several points in Idaho, Oregon and Washington. Total cost has been set at $2,750,000.

Ammonia from Shell's Pittsburg, Calif., plant will be shipped by barge to a Portland, Ore., terminal where part of the cargo will move on to Pasco, Wash. Final distribution will take place at both Portland and Pasco.

Current activities include construction of a loading dock at Pittsburgh and installation of a new 1,800 storage sphere, a 2,700 ton sphere with railroad loading facilities and scales at Portland and twin 2,700 ton spheres and facilities at Pasco. All are expected to be completed by October.

India Pesticide Plant

An insecticide plant near Delhi, India, is expected to begin production early next year, according to S. S. Jaggia, managing director of Hindustan Insecticides. He said the plant will be able to supply approximately 700 tons of DDT annually to be used mainly for the anti-malarial campaign in India under the auspices of the Ministry of Health.

Final plans for the plant were made two years ago in a joint program by the Indian government with the UNICEF and the UN Technical Assistance Administration.

Coop Plant Dedication

Co-operative Farm Chemicals Association's new ammonium nitrate plant, located on a 347 acre site near Lawrence, Kan., was scheduled to be dedicated on Aug. 31. Overall cost of the project was estimated at $15 million.

Ammonia will be converted to ammonium nitrate prills and nitrogen solutions in the 330-ton a day plant, which was designed and constructed by the Girdler Co. Friedrich Uhde, K. G., of Dortmund, Germany, designed the ammonia oxidation unit.

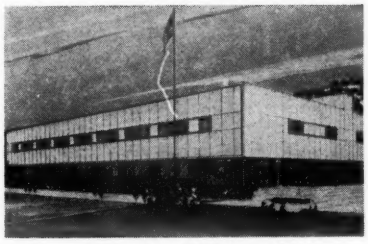
IMC Acquires Sonsel

International Minerals & Chemical corp. has acquired Sonsel Refractories corp. at Brighton, Mich., Louis Ware, IM&C president, recently announced. The plant will continue production of zirconium refractories under a patented process and other special refractories on an expanded scale as part of the Eastern Clay Products dept. of International's Industrial Minerals div.

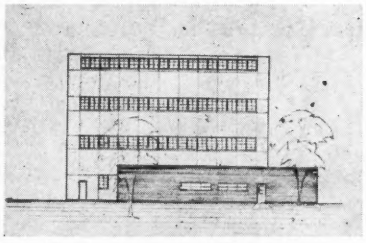
Pass Pest Control Bill

The House has passed Senate bill 3697 which gives the secretary of agriculture authority to cooperate with Canada and Mexico in the control of pests and plant diseases which may threaten agriculture in the United States.

Columbia-Southern Building Two Labs



Control and Research



Development and Pilot Plant

Columbia-Southern Chemical corp. recently announced that construction contracts have been awarded for the erection of two laboratory buildings at Natrium, W. Va.,—one for control and research work and the second and smaller building for development and pilot plant operations.

Construction of the control and research laboratory will be started within a month by the Austin co., which also was awarded design of the building.

Seabright Construction co. has started work on the development building, and the estimated completion date is December, 1954.

People

American Potash & Chemical corp.'s Pacific Northwest regional agronomist, Trevor Steele, has moved his headquarters from Des Moines, Wash., to 350 Hansen Ave., Salem, Ore.

New assistant manager of chemicals at **Antara Chemicals div.,** General Aniline & Film corp.'s Charlotte, N. C., branch, is Carl A. Bergman. He is succeeded as technical manager of the Textile Chemicals section of Antara by Dr. George M. Gantz.

Attapulgus div., Minerals & Chemicals Corp. of America, has announced the appointment of Robert W. Wert to head up the technical sales and service staff handling the company's agri-

cultural chemical products. He succeeds W. M. Jarnagin, who has been assigned to an urgent development project apart from agricultural sales.

Dr. G. S. Schaffel has been named manager of research for **Brea Chemicals, Inc.**, according to an announcement by Homer Reed, president.

Schaffel

A native of Pennsylvania, Dr. Schaffel received his Doctorate from Carnegie Institute of Technology in 1942 and accepted a Post-Doctorate Fellowship in Fundamental Research at Westinghouse research labs.

The retirement of William H. Brandt after more than 44 years of service has been announced by L. B. McKnight, president of **Chain Belt co.** W. E. Schauer has been appointed successor to the post of assistant secretary.

Two recent promotions at **Chase Bag co.'s** general laboratory at Chagrin Falls, O.: Russell F. Jagoditsh named chief chemist and Jack W. Means, assistant chief chemist.

Seven recent engineering graduates have joined **Columbia-Southern Chemical corp.** Allan Lieb, Alfred Thompson, Andrew Stebnicki, Richard Bonnett, Joseph Marshek and Arthur Baker have been assigned to the firm's Barberton, O., plant and Robert Lindveit to the Lake Charles plant.

Page Edmunds has been appointed general sales manager of the Petroleum Catalyst dept. of **Davison Chemical co. div.**, succeeding Charles W. Saacke.

Appointment of Dr. William E. Collins to the technical staff of **Diamond Alkali co.'s** Chlorinated Products div. has been announced by C. E. Lyon, vice president and division manager. Dr. Collins will be concerned chiefly with development of new farm chemicals as well as technical service on Diamond's present products having agricultural applications. He will be headquartered in Newark, N. J.

Collins

The election of Richard A. Brown as president of **The Dickerson co.**, has been announced by the company's board of directors.

Dr. Wendell H. Tisdale, plant pathologist and a technical advisor on agricultural subjects in **DuPont co.'s** Grasselli Chemicals dept., retired July 31 after 27 years with the company. Dr. Tisdale was instrumental in the development of the dithiocarbamate and thiuramsulfide fungicides and was credited with the development of Lignasan fungicide, DuPont reports. Earlier, while a plant pathologist with the USDA, he developed a method for control of straighthead disease of rice which is still in use after more than 30 years.

Tisdale

Federal Chemical co.'s president and director, John V. Collis, has accepted an appointment to the 4-H Builders Council of the National 4-H Club Foundation.

Geigy Chemical corp. has announced the retirement of Mark Weisberg, formerly in charge of its Alrose Chemical co. div. in Cranston, R. I. Weisberg founded Alrose in 1935 and continued as president until it became a division of Geigy this year.

New production supervisor of **Grace Chemical co.'s** Urea dept. at Memphis, Tenn., is C. P. McDonald, formerly with Lion Oil Co.

Grand River Chemical div., Deere & co., has named Sam M. Moffett senior chemist in its Research dept.

John D. Zigler has been promoted to the newly-created position of operating manager for **International Minerals & Chemical corp.'s** Plant Food div., and F. S. Walters has been named acting production manager, replacing F. H. Perrin.

For the past three years Zigler has been area manager at Chicago Heights, Ill. Walters went to the company's Chicago headquarters staff four years ago from the position of superintendent of the Augusta, Ga., plant food operation.

Concurrently the company announced the appointment of Don W. Allison as industrial engineering supervisor.

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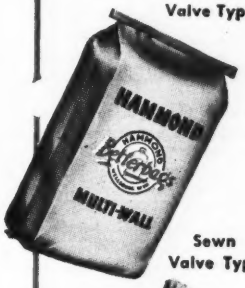
Pasted Valve Type



Sewn Valve Type

Open Mouth Pasted Bottom

Open Mouth Sewn Bottom

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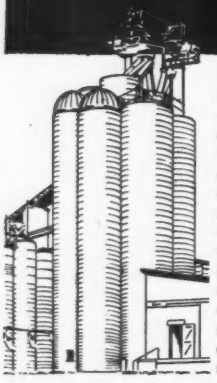

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Former **International Minerals & Chemical corp.'s** Bonnie, Fla., plant manager, James A. Wilson, has been promoted to production manager for the Phosphate Chemicals div. Neil O'Donnell, who has been acting superintendent of the Bonnie plant for several months, becomes plant superintendent.

At the same time it was announced that Leonard W. Gopp has joined the Phosphate Chemicals div. as special products sales manager.

Other changes within **International Minerals & Chemical's** Plant Food div.: Sam Broyles succeeds J. Hampton Hyder as district sales manager at Greeneville, Tenn.; John M. Maschoff succeeds W. B. Green as district credit manager at Tupelo, Miss.; James K. O'Cain succeeds his father, J. P. O'Cain as superintendent of the Mulberry, Fla., plant and Robert L. Right replaces Jack K. Lindsey as district sales manager at Cincinnati, O.

Hyder, Green and Timmons have retired, and Lindsey is being transferred to the Potash div. as district sales manager at Shreveport, La., replacing the late Henry C. Aaron.

Edward Tubbs, who is comptroller of **International Minerals & Chemical corp.,** has been elected president of Chicago Control for Controllers Institute of America, and Spencer L. Lott, controller of Smith-Douglass co., Norfolk, is a new director of the organization's Richmond (Va.) Control.

W. Standish Miller has resigned as director of engineering for **Mathieson Chemical corp.** after 12 years' association with the company.

Pacific Chemical and Fertilizer co.'s branch manager at Kahului, Maui, G. F. Carr, has been transferred to the Honolulu office. Roger I. Knox has been named his successor at Kahului.

Pennsylvania Salt Manufacturing co.'s new Chicago Heights, Ill., plant manager is Vance N. Wilson. Ground for this Chicago Hts. operation was broken on July 8. At the time of his appointment Wilson was in charge of starting operation of the BHC plant at Calvert City, Ky.

Robert W. Clarke has been named manager of the new Pennsalt plant at Delaware, O. Clarke, who joined the company in 1944, supervised the start-up of the Natrona, Pa., BHC plant and later served as supervisor of the DDT plant.

New addition to the Fertilizer Sales dept. of **Phillips Petroleum co.,** Kansas City, Mo., is James H. Gillie, who had been with Thurston Chemical co.

Walter W. Ethier, Jr., has been named factory manager of **Pittsburgh Plate Glass co.'s** Atlanta Paint div. in East Point, Ga.

He joined the company's Milwaukee Paint div. Technical dept. in 1939 and became manager of the Corona Chemical div. 10 years later.

A. H. Beidel became purchasing agent for **Potash Co. of America,** following the retirement of C. E. Bothwell on Aug. 1. Bothwell will remain with the title of purchasing associate.

Raymond Bag co. sales staff appointments: James M. Green will be responsible for sales in southern Indiana and all of Kentucky, with headquarters in Louisville; A. P. Wolff, with headquarters in Detroit, will service customers in northern Indiana and all of Michigan.

Dean G. Abercrombie is new manager of **St. Regis Paper co.'s** Buffalo, N. Y., Multiwall Packaging div. office and will handle multiwall bag sales in western New York state.

Hugh W. Sloan, vice president of **St. Regis Paper co. (Canada) Ltd.,** has been appointed to direct the company's operations.

J. R. Simplot co. has appointed its vice president, W. Grant Kilbourne, general manager of the Fertilizer div. He will direct production, mining sales and distribution activities with headquarters at Pocatello, Ida.

The appointment of Robert V. Peabody as general Traffic manager has been announced by **Smith-Douglass co.** He had served in the traffic dept. of Spencer Kellogg & Sons, Inc. and left U. S. Industrial Chemicals co. where he was a rate analyst to take the Smith-Douglass post.

W. B. Copeland has been appointed executive vice president of **Smith-Douglass co.** He has been a vice president since October, 1948. S. L. Lott, controller and assistant treasurer, at the same time was named company treasurer. Previously President Ralph B. Douglass also held the post of treasurer.

J. R. Riley, Jr., has resigned as vice president in charge of sales, **Spencer Chemical co.,** but will continue to be active in the management of the company as a consultant, director and member of the executive committee. J. E. Culpepper was elected vice president and will continue as general sales manager.

Concurrently three Sales div. promotions were announced: Harold R.

Dinges was named assistant general sales manager; George V. Taylor, director of product sales and E. W. Segebrecht, director of sales development.

John B. Gallagher has joined the staff of **Swift & co.'s** Plant Food div. in Hammond, Ind., as a chemical engineer with the research laboratory.

The division has transferred A. E, Huckabee, assistant to the chief entomologist in Calumet City, Ind., to Los Angeles, where he will be assistant to the manager.

Field sales manager for **Union Bag & Paper corp.'s** Multiwall Bag Sales div. is J. J. Patterson, Jr. His duties include advising and aiding district managers and field sales representatives on a national basis.

Patterson

William W. Dipman has been named northeastern district sales manager and William T. Bess, Jr., southeastern district sales manager.

W. K. McCready has been named director of manufacturing by **Velsicol corp.** He assumes direction of all manufacturing in both the Memphis, Tenn., and Marshall, Ill., plants.

Assistant director of manufacturing under McCready will be Richard R.

McCready

Schwankl

Schwankl, who started with Velsicol 7 years ago in the Accounting dept.

Virginia-Carolina Chemical corp. has appointed Douglas W. Laird assistant manager of its Purchasing dept., succeeding D. M, Low, who retired on July 1 after more than 50 years of service.

Laird

Laird received his B.S. degree in business administration from the University of Richmond, where he was a member of Phi Beta Kappa and Omicron Delta Kappa. He joined V-C in 1948.

S. M. Edison, president of Edison Chemical co., heads a group which has purchased **Enoz co.** division of Diversey corp. A new firm is being organized, to be known as Enoz corp. which will continue to manufacture insecticides and drugs.

A regular quarterly dividend of 62½ cents per share was declared by **Freeport Sulphur co.'s** board of directors, payable on Sept. 1 to stockholders of record Aug. 16, 1954.

Kelly Agricultural Products co. will become the Kapco div. of Summers Fertilizer co. according to reports. Philip P. Rosette, Kelly president, will be general manager of the Kapco div. which will continue to have its general offices at McKeesport, Pa.

A quarterly dividend of 50 cents per share on **Lion Oil co.'s** common stock has been declared by the company's directors to holders of common stock of record at the close of business Aug. 27.

Michigan Chemical corp. reports that additions to plant and equipment during the first six months of 1954 totalled $421,000.

The company's research and process development departments are continuing to concentrate on further diversification of several product groups based on brine chemistry, said President Theodore Marvin, and improvement was noted in the company's insecticide and fumigant units with volume and prices in improved condition.

Plans for a proposed $18 million plant to process ammonium nitrate in Southern Alberta are nearing completion, according to an announcement by officials of **New Britain Dominion Oil co.**

The statement of **Phillips Petroleum co.** and subsidiaries for the first six months of 1954 shows an increase of 60 per cent in fertilizer sales value over the same period last year.

Pittsburgh Plate Glass co. has moved its Manhattan district office from 30 Rockefeller Plaza to an entire floor of a recently completed office building at 579 Fifth Avenue, New York City.

A new movie describing grasshoppers, the damage they do and how they are controlled with modern insecticides has been prepared by **Shell Chemical corp.** Entitled "Exit Grasshoppers," it shows recommended control techniques for crop land and range land.

Shea Chemical co.'s phosphoric acid unit at Jeffersonville, Ind., has

Company Briefs

A mailing folder dealing with potash and its agricultural uses has been issued by **American Potash & Chemical corp.** as part of its "Profit Plugs" sales promotion campaign. Based on the theme that "potash gives bumper crop insurance," the folders will be mailed to farmers and farm chemicals jobbers.

American Potash & Chemical corp.'s price on 60 per cent muriate of potash has been adjusted to meet competitive prices of domestic producers located at Carlsbad, N. M. Price for contracts made prior to July 1, 1954 was changed to 35.868 cents per unit K_2O in bulk, f.o.b. Carlsbad and 60.27 cents per unit K_2O in bulk, f.o.b. cars at certain designated ports.

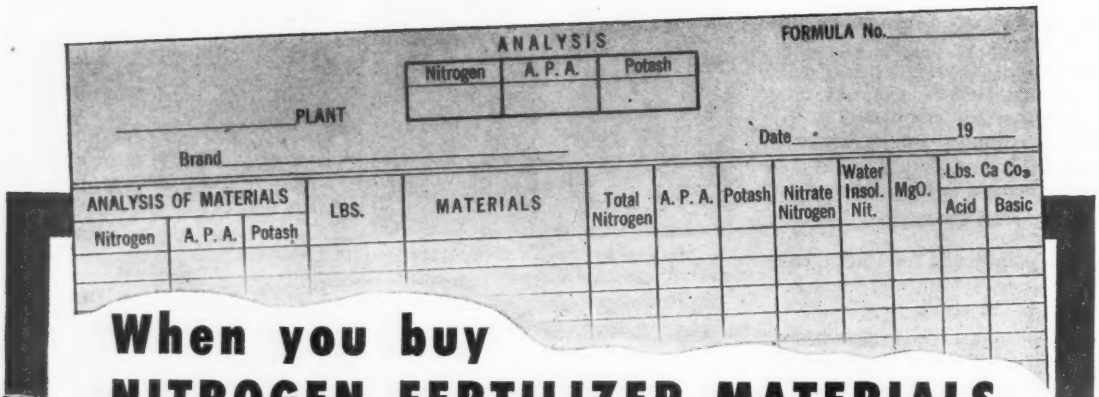
Plans to test the practicability of hauling fuel oil by truck instead of train from the Los Angeles area to **American Potash & Chemical corp.'s** main plant at Trona, Calif., have been announced by the corporation. Two tank-and-trailer units are being leased and test runs are expected to be started this month on a 'round-the-clock' basis.

Earnings of **Atlas Powder co.** rose 6½ per cent in the first six months of 1954 despite a slight decrease in sales, Ralph K. Gottshall, president, stated in the semi-annual report to stockholders. Net earnings for the first six months of 1954 were $1,230,656, compared with $1,155,602 earned in the first half of 1953.

Blockson Chemical co.'s $2 million sulfuric acid plant was expected to start full production in August. The Joliet, Ill., plant is rated at 450 tons per day of 100 per cent acid.

Caldwell's, Inc., located at Spartanburg, S. C., has been chartered to manufacture fertilizer and mix feeds and to buy, sell and process cottonseed and cottonseed by-products. James B. Caldwell is president of the company, which has authorized capital of $100,000.

Chemical and Industrial corp. has been given the right to license the Stengel ammonium nitrate process to users by Commercial Solvents corp.



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"Controlled Quality"

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When you visit El Dorado or New Orleans you will want to inspect Lion's giant chemical plants where Lion Nitrogen Fertilizer materials are manufactured. You'll be impressed by the painstaking efforts to assure highest quality products... reaching you in first-class condition. This is what we mean by "Controlled Quality"—which can mean a great deal to you.

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offers one-stop nitrogen service
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LION ANHYDROUS AMMONIA—For formulation. A uniformly high-quality basic product. Nitrogen content, 82.25%.

LION AQUA AMMONIA—For formulation or acid oxidation. Ammonia content about 30%. Other grades to suit you.

LION AMMONIUM NITRATE FERTILIZER—For formulation or direct application. Improved spherical pellets. Guaranteed 33.5% nitrogen.

LION NITROGEN FERTILIZER SOLUTIONS—For formulation. Three types to suit varying weather and manufacturing conditions.

LION SULPHATE OF AMMONIA—For formulation or direct application. Large free-flowing crystals. Guaranteed nitrogen content, 21%.

TECHNICAL SERVICE—Lion provides special technical assistance for fertilizer manufacturers. Write to CHEMICAL SALES DIVISION for quick service.

LION OIL COMPANY
EL DORADO ARKANSAS

been completed ahead of schedule. Shea will use the acid in its own polyphosphate operation at Jeffersonville and also will ship both fertilizer and food grade.

Change of address: **Sinclair Chemicals, Inc.,** has moved its offices, effective Aug. 7, to the Sinclair Oil Building, 600 Fifth Avenue, New York City 20.

"Ammonia," a 50-page book on the technical aspects of handling, physical properties and allied topics, has been released by **Spencer Chemical co.** Containing 47 halftones and drawings and 17 charts and graphs, the book is concerned with both anhydrous and aqua ammonia.

The Richmond Research Center of **Stauffer Chemical co.** will be expanded to provide space for bench scale pilot plant facilities and additional research activities, the company has announced. New construction, estimated to cost approximately $100,000, will add 4,000 square feet to the present building by the end of the year.

Associations & Meetings

NH_3 Equipment Needs

C. L. Hedman and J. R. Turner of Shell Chemical corp. told the 47th annual meeting of the American Society of Agricultural Engineers on June 23 that the big need now in anhydrous ammonia application is a simple metering device that will maintain constant flow in spite of variations in container pressure.

For direct injection they said typical equipment would be a 30–35 HP row crop tractor equipped with three to 10 injection blades, carrying 500 to 900 pounds NH_3, with a maximum metering capacity of 700 to 1,000 pounds per hour, or a trailer applicator of similar capacity.

NCC Lists 24 Defoliants

Twenty-four different brands of cotton defoliants, derived from 11 basic compounds, will be marketed by manufacturers during the current growing and harvesting season, according to information from the National Cotton Council.

Although no "new and really outstanding" material has been placed on the market this year, the council's Production and Marketing div. staff members point out, manufacturers have revamped many of their formulations to give improved defoliation performance and to facilitate application and handling.

Nelson and Lang to Speak

E. S. Nelson, of International Minerals & Chemical corp., and W. A. Lang, Monsanto Chemical co., are scheduled to speak at the Eighth National Chemical Exposition to be held in Chicago, Oct. 12–15.

Nelson's topic is "Principles of Industrial Product Promotion," and Lang will speak on "Guides for Exhibitors." Also on the program is a symposium on exposition marketing of chemicals arranged by the Chemical Market Research Association.

Wisc. NH_3 Conference

The Madison Anhydrous Ammonia conference which was held Aug. 18, was expected to draw an attendance of more than a thousand farmers, county agents, soil scientists and businessmen. Sponsored by the Soils dept., University of Wisconsin; the Great Lakes Region, AAI and the Agricultural Ammonia Institute, the meeting featured speeches by several of the nation's top agricultural scientists and a trade show.

Garden Supply Shows

Dates have been revised for eastern, middle and western Garden Supply Trade Shows, sponsored by GARDEN SUPPLY MERCHANDISER magazine.

The Western States Garden Supply Show will be held in the Exposition building at Oakland, Calif., on Sept. 19–22; Middle States Garden Supply Show in the Hotel Sherman, Chicago, Ill., on Jan. 9–12, 1955 and Eastern States Garden Supply Show, 71st Infantry Regiment Armory, New York City, Jan. 31–Feb. 3, 1955.

A Consumer Day is planned for the Chicago meeting on Jan. 9 when the public can visit the show.

Georgia Fertilizer Meet

"Concrete Action to Obtain Acceptance of College Approved Fertilizer Grades" was the theme for 1954 Fertilizer Dealer-Manufacturers Fertilizer conferences, sponsored jointly by the Agricultural Extension Service, University of Georgia College of Agriculture and the Georgia Plant Food Educational Society.

Meetings were held at Calhoun, Athens, Plains and Midville, Ga., during July.

New NFA Members

A total of 28 firms were elected to membership in the National Fertilizer Association by its board of directors at the June convention, according to the NFA NEWS. An additional application for membership received since the convention will be acted upon this fall.

Seventeen of the 29 firms are joining NFA as "regular" members.

English Society Elects

At the seventh annual general meeting of the Fertiliser Society (of England) J. T. Proctor was elected president, Dr. R. Stewart, vice president and C. T. Ward, R. G. Warren and R. A. Webb were named to the council.

Classified

MAN WANTED: For small agricultural Chemical Manufacturer located in Eastern Penna. Office work and a little nearby selling. Must be thoroughly familiar with bugs, plant diseases, remedies and insecticide business. Write "470" care FARM CHEMICALS, Philadelphia 7.

WANTED: Superintendent experienced full charge of mixing in a small ammoniating plant located in a central Atlantic state. Address "475" care Farm Chemicals, Philadelphia 7.

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Buy for Less!

We will make on order in any concentrate formulations of the following:

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DDT, BHC, TOXAPHENE, HEPTACHLOR,
CHLORDANE, LINDANE, MALATHION

Rock Bottom Prices!

Box 455, Farm Chemicals Magazine

Equipment & Supplies

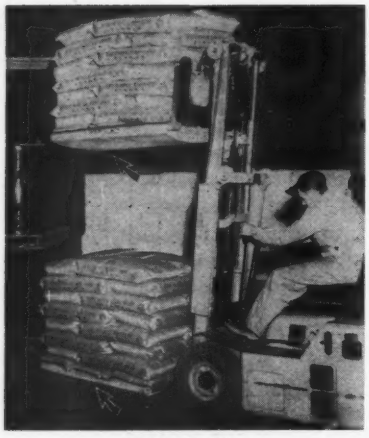
Unique Pallet from Cyanamid

American Cyanamid co. has developed a unique method of industrial palletizing which is already in use in shipping AERO phthalic anhydride.

The pallet is a paper sling with paper tubes into which new-type bayonet forks, readily attached to any fork lift truck, are slipped for lifting and carrying.

The pallet sling is no thicker than heavy wrapping paper and the entire

New Paper Pallet



Pallet in Use

pallet weighs less than three pounds. Entire loads can be shipped double decked, unloaded and warehoused as a completely palletized shipment.

Cyanamid points out that the pallet can be rolled up like a map or stored flat with the tubes tied in a bundle. It is being patented and manufacturing licenses will be offered to companies in the paper industry.

Revamped Chamber Process

International Processes, Inc., reports that the Kachkaroff-Guareschi process, a revamped chamber method for sulfuric acid production, has been patented in the U. S. Use of polyvinyl chloride linings instead of lead helps decrease both production costs and capital investment.

The K-G process, with 1½ mm thick linings, normally produces 80–81 per cent acid, can produce 90–92 per cent and theoretically can turn out 99 per cent material. It can also be adapted to produce simultaneously both sulfuric and nitric acids.

Sulfur dioxide to acid conversion runs 99.9 per cent and exit gases from stack are reported to run less than .001 per cent SO_2. In Europe production costs are said to run about $6.50 per ton of 100 per cent. Average capital investment in Italy and England for a 100 ton per day plant has been $550,000, only half the price of an equal capacity contact unit.

The process requires .12 cubic feet of reaction space per pound sulfur per 24 hours and the acid section consumes only one kwh per ton of acid. Various raw materials can be utilized.

New Coddington Packer

A new Auger-matic Bag Packer, produced by E. D. Coddington Mfg. co., eliminates the need for pre-weighing

and assures tightly filled valve bags. The unit has been redesigned to include a shaker which jolts each bag during the filling process.

Another feature is the security clamp which holds the valve bag in place regardless of the force with which material flows from the filling spout.

A snug fitting spout minimizes dust hazards, prevents waste and keeps bags clean. The packer can be caster mounted for easy movement.

For information, circle 273 on Readers Service card.

Clark Power Shovel

Clark Equipment co.'s new Bulk Master is a small, mobile power shovel with an 11 cubic feet or 1,200 pound capacity. It is especially adapted for working in narrow aisles and tight corners and has an outside turning radius

of only 73 inches. Operating speeds include full-shovel lifting, six seconds; dumping, one second and lowering, three seconds. The shovel has a dumping angle of 60 degrees and the bucket can be carried without spillage in a completely lowered position.

A four cylinder Continental gas engine provides power for the shovel which has two speeds in both forward and reverse. Fully loaded it climbs a 14 per cent grade.

For information circle 268 on Readers Service card.

Poly-Kote for Multiwalls

A sheet coated with a combination of polyethylene and wax has been developed by Arkell & Smiths for use in multiwall bags. Named Poly-Kote, it will be incorporated into multiwalls to sell for less than bags made with straight polyethylene.

The photo shows a calcium chloride moisture-pickup test in which an asphalt-laminated package was tested against a Poly-Kote bag. The asphalt-laminated sack on the left shows how the chemical caked and stained the interior as compared with the good condition shown by the Poly-Kote clad material.

Seamless Film Bags

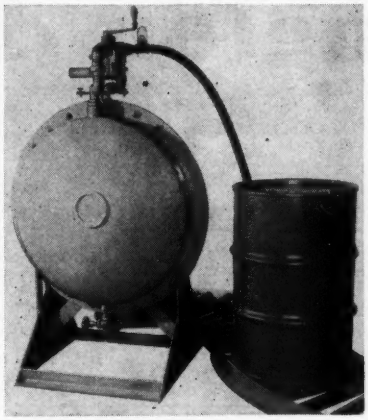
Transparent and translucent film gusset bags without bottom or center seams are produced on the Renka bag machine now available through Geveke & co. Said to be virtually sift-proof because of the novel construction, they can carry a printed sales message on both sides, if desired.

This machine also makes 11 other types of packages in sizes ranging up to 22½ inches in length and 13 inches wide.

Semi-Auto Drum Filler

Semi-automatic filling of 30 and 55 gallon drums can be accomplished with the Diafram Filler, a new machine from Drum Equipment corp. Rates of up to 60 units per hour are possible with 55 gallon units with accuracy of at least 001 per cent.

Each side of the elliptical filler body, divided by a double diaphragm, is connected to a common four-way valve. Liquid is directed under pressure through the valve filling the body on one side and forcing liquid on the opposite side of the diaphragm through



the other part of the valve into the drum being filled.

Hand or air operated controls are available and the unit can be made of special materials for use with corrosive liquids.

Suppliers' News

During the current year, **Bemis Bro. Bag co.** will again sponsor fellowships for two college professors for study of the Bemis organization and operation. Granted in cooperation with the Foundation for Economic Education the study is felt to be mutually valuable in creating better understanding between teachers and business men.

Bemis has also announced the start of operations at its new Wilmington, Calif., multiwall plant. Full productive capacity is expected to be reached by the end of September.

All sales activities for **Hammond Bag & Paper co.** in Michigan are now being handled from Chicago. J. E. Cornell, Jr. and W. A. Sheets, Hammond's Chicago representatives, are located at 38 S. Dearborn St.

Expansion of **Hudson Pulp & Paper's** multiwall manufacturing operations was marked by a sales service seminar. Importance of customer service was emphasized at the week-long affair which was conducted by S. W. Franklin, director of merchandizing.

A new **International Paper co.,** Bagpak sales office is to be opened in Des Moines, Iowa. Under Dale Rowe, the new office will handle multiwall sales in parts of Iowa, South Dakota and Missouri.

A new branch sales office has also been opened in the Dixie Terminal Building, 49 E. 4th St., Cincinnati, O., and will house representatives of three principal divisions. James Woodrow will represent the Bagpak operation.

Facilities for internal lining of railway tank cars have been expanded by the **Lithcote corp.** through cooperation with the Chicago & Northwestern R. R. The company can now simultaneously house 20 tank cars or flat cars transporting large vessels in the plant at Chicago's Proviso yards.

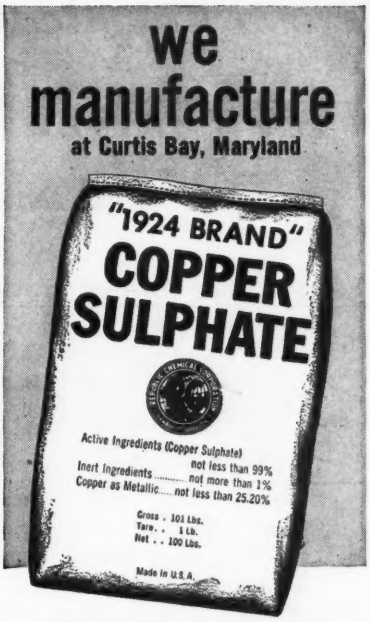
Baked phenolic linings are applied in the new plant which can turn out up to 45 cars per month.

Offices of the **Pennsylvania Crusher co.** have been moved to West Chester, Pa., from Philadelphia. The test crush lab is also being moved to the new quarters from Norristown, Pa.

A large addition to **Vulcan Steel Container co.** facilities at Birmingham, Ala., permits for a 30 per cent expansion in operations.

A work kit produced by **Yale & Towne** provides a method for predetermining the times necessary for fork lift trucks to perform specific operations. It can assist in determining the present efficiency of lift trucks as well as in planning for future needs.

A new anti-caking agent has been added to DuPont's Two-Sixty-Two feed compound. Use of the new conditioner does not affect protein value of the urea compound and improves flow and mixing properties.



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Farm Chemicals

Washington Report

By Fred Bailey & John Harms

Food & Drug Administration was driving hard, as we went to press, to have regulations under Miller bill amendments to the Food and Drug law ready to go the early part of September. . . in time for the NACA convention. FDA Boss George Larrick told FARM CHEMICALS the regulations would be "highly tentative". . . to be kicked around for improvement at the convention.

Tentative tolerance proposals for many of the newer pesticides—possibly as many as 100—also were to be ready for discussion at that time. FDA aim is to get some tolerance proposals actually in the mill before the end of this year. Proposed regulations under Miller bill amendments still awaited formal approval of Health, Education and Welfare Secretary Hobby.

Lower price supports plus the most stringent production controls in history are expected by farm officials here to put a premium on fertilizer and pesticide applications next year. One farm leader says the outlook for next year more than any recent year points to profits only through higher yields per acre.

The new farm law permits a lowering of price supports for five basic crops for the first time since World War II. Crops headed for lower support rates either next year or in 1956 are cotton, corn, wheat, peanuts and rice. The sixth "basic," tobacco, will continue to get high 90 per cent supports. Reason: Tobacco growers are said to stick to government control programs better than growers of other crops.

The new law permits the Secretary of Agriculture to cut supports to 82.5 per cent of parity. Secretary Benson is expected to cut only wheat supports to the new limit because of the tremendous surplus of that crop. The other basics very likely will be dropped to near that level more gradually, probably not until 1956—unless Congress again revises the support law.

The 82.5 per cent to 90 per cent parity support range approved by Congress this year is a compromise between the 90 per cent parity-continuation farm bloc and the Administration's proposal to permit supports to flex between 90 per cent and 75 per cent of parity.

For 1955 crops, the new law means: Corn support may drop to 85 per cent of parity, or to about $1.55 per bushel; wheat drops to about 82.5 per cent of parity, or to about $2 per bushel; cotton is due to hold at near 90 per cent, or at about 31.58 cents per pound; rice also may stay at 90 per cent or about $4.83 per cwt. and peanuts may decline to 86 per cent, or to about 11.7 cents per pound.

Drought this year has reduced what looked like a bumper second-largest total volume crop output into only the sixth largest production on record. Corn, spring wheat, soy beans, peanuts and sorghums were crops hardest hit by searing heat and lack of moisture. Corn crop alone took a terrific 15 per cent cut in prospects . . . most of this was in the Main Belt.

This was bad news for farmers who counted on big yields to keep income near last year's levels in the face of a continuing price decline. In many cases where yields

Three of the A.A.C. Co's electrically-operated draglines at work at our phosphate mines in Central Florida. Bucket capacities range from 9½ to 17 cubic yards. The 17-yard draglines with their 175-foot booms each weigh more than a million and a half pounds and can move 35,000 tons of material in 24 hours. From these rock deposits flow a continuous stream of high quality phosphate rock, assuring a dependable source of supply of AA QUALITY phosphorus products, see list below.

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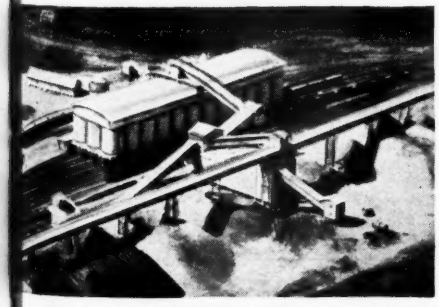

From the air—wet rock storage and drying plant, with dry rock storage silos in background. These silos, 29 in number, have a total capacity of 40,000 tons of dried rock. Under the silos are four runways where 40 railroad cars can be loaded at a time.

principal AA QUALITY products

All grades of Florida Pebble Phosphate Rock
AA QUALITY Ground Phosphate Rock
All grades of Complete Fertilizers **Superphosphate**
Gelatin **Bone Products** **Salt Cake** **Ammonium Carbonate**
Sulphuric Acid **Fluosilicates** **Insecticides and Fungicides**
Phosphoric Acid and Phosphates
Phosphorus and Compounds of Phosphorus

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looked much above average in the early part of the year, following the July drought yields went below average.

Some hope for improvement was provided by August rains, but just how much good it would do was still in question late in the month. Hardest hit farm areas are western parts of south & central Great Plains, central Texas, much of Kansas, most of Missouri, Georgia and South Carolina.

Important new Agriculture department Handbook No. 69 just off the press: "Chemicals Evaluated as Insecticides and Repellents at Orlando, Fla.," by W. V. King. For sale by the Superintendent of Documents, U.S. Gov't. Printing Office, Washington 25, D. C. Price: $2.50 per copy.

This handbook describes results in tests of about 11,000 compounds and formulations as insecticides and repellents for body lice, mosquitoes, chiggers, house flies, cockroaches, ticks and flies. It's based on investigations to develop control measures for insects and arachnids of medical importance to the Armed Forces at the Orlando laboratory of the Bureau of Entomology and Plant Quarantine.

The main table in the handbook gives the relative effectiveness of chemicals tested. Results are reported on 14 tests against 7 species. At least 2,000 compounds were evaluated by each test. Shorter tables give results with smaller numbers of compounds against other species or other types of tests.

"Losses in Agriculture," a new publication being worked up by the Agriculture department, attempts to put a dollar value on crop losses from farm to dinner table due to any and all causes, including insects and improper use of fertilizer.

It's the first official effort to appraise the over-all loss picture. While some of the estimates are admittedly only educated guesses, officials here believe it is a long step in the right direction.

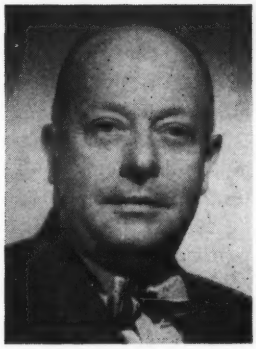
According to the study: We lose an average of $14 billion worth of farm goods each year from all causes combined—preventable and unpreventable. That's one third of agriculture's potential production on present acres. Some 120 million fewer acres of crop land (not counting pasture and range requriements) would have produced the 1942–51 food and feed volume if loss causes had been eliminated.

Diseases reduce the total value of crops by $2.8 billion, or about 7 per cent of potential production of all farms and forest growth. Insects cause a loss of nearly $2 billion in the value of crops, or about 5 per cent of potential output. Value of livestock and poultry is reduced about $3 billion by diseases, parasites and insects.

The report does not attempt a comprehensive survey of which losses could be prevented if all producers used recommended control measures, and if weather cooperated, but it does analyze several specific hazards. For example, losses from diseases of cotton could be reduced by 75 per cent. . . from apple diseases and from potato diseases, about one-half. . . and from the diseases of wheat, about 23 per cent.

Improper fertilizer placement accounts for as much loss as a quarter of a billion dollars, or 1.5 per cent of the total value of fertilized crops. Cost of replacing major nutrient elements removed through soil erosion—using chemical fertilizers—would be a multi-billion dollar job. Cost of replacing only the nitrogen and phosphorus is estimated at $4.3 billion. . . replacing the nitrogen, phosphorus and a quarter of the potassium, would cost an estimated $7.75 billion.

Guest Editorial



What can be expected from the Miller Amendment

By Lea S. Hitchner

Executive Secretary

National Agricultural Chemicals Association

THE PASSAGE of the Miller Pesticide Residue Amendment to the Federal Food, Drug and Cosmetic Act brought about some entirely new concepts pertaining to the regulation of chemicals which may appear in or on foods. This new amendment, signed by the President on July 22, has as its purpose the assurance of greater protection of public health by improving procedures for establishing regulations limiting the amount of residues of pesticide chemicals which may be permitted to remain on raw agricultural commodities. The scope of the legislation relates to the use of pesticides in the production, transportation and storage of such agricultural commodities in interstate commerce.

Most Important Law Since 1947

This Pesticide Residue Amendment is the most important Federal legislation which affects the pesticide industry and the control of pesticides in the production of food since the passage of the Federal Insecticide, Fungicide and Rodenticide Act in 1947.

The question giving rise to this legislation is one of a long history of criticism. The Federal Food, Drug and Cosmetic Act which was passed in 1938 failed to provide practicable procedures for limiting the quantity of residues which could safely appear in or on foods. The failure of the 1938 Act lay mainly in the costly and time-consuming procedures which were necessary to obtain a basis upon which tolerances for these residues could be made.

The Miller Pesticide Residue Amendment is designed to improve these procedures so that tolerances for pesticides can be established in a relatively short time and do so in a manner that the public food supply will be free of harmful excessive amounts of pesticide residues. Yet at the same time, it gives to producers the latest developments which arise in the field of pest control materials. Evidence that the old procedures are not practical lies in the fact that from 1938 to date no pesticide residue tolerances have become effective.

Provisions of the Federal Food, Drug and Cosmetic Act establish that a food is adulterated if it contains any poisonous or deleterious substance which is unnecessary or which exceeds an amount specified by regulations of the secretary of health, education and welfare. Under this act pesticide chemicals used in agricultural production are generally considered to be poisonous or deleterious substances.

Changes Provided by Amendment

The Miller Pesticide Residue Amendment changes two sections of the Food and Drug Act and adds one other. The new legislation sets a precedent for an entirely new approach to the legal aspects of controlling "chemicals in foods." By changing section (402) the law now separates the consideration of chemicals used for the production of raw agricultural commodities from other chemicals which are added to foods during some stage of their processing. Prior to this time, all of these chemicals were considered under the same type of Federal regulation under the Act.

The legislation also provides some entirely new features in the integration of technical considerations with control by law. It recognizes that the problems involved are of such a nature that only experts, in the final analysis, are sufficiently founded in scientific knowledge to be able to determine what does or does not constitute a hazard to the public health.

Many Advantages to Users

The adoption of this new section of the Food and Drug Act should bring many advantages to those concerned with the use of pesticide chemicals. The food consumer is protected against the unsafe use of pesticides which may appear in the food supply and thus the fears of some consumers in this regard should be allayed.

Chemical manufacturers and state and Federal agencies which advise farmers on the use of pesticides will have standards upon which to base recommendations for the use of these chemicals. For the first

time the grower will be assured that he would be in compliance with the law if he follows the recommendations of these agencies and those of responsible manufacturers.

Under the old procedure, there was considerable doubt on the part of the farmer whether his raw produce when shipped in interstate commerce would be subject to seizure due to excessive quantities of pesticide residues. The standards upon which he could base such an assurance simply were not available to anyone in the field. In addition the Department of Health, Education and Welfare under this new amendement has definite standards to carry on the enforcement of its responsibilities as they relate to a safe food supply warranted by the Federal Food, Drug and Cosmetic Act.

Summary of Procedures

Under this legislation the establishment of a tolerance for a pesticide used in agriculture can be initiated by the manufacturer of the pesticide and by the secretary of HEW. The manufacturer in such an instance files a petition with the secretary of HEW requesting a certain tolerance on a chemical for use in agriculture. With such a petition he must file scientific data and reasons for support of the tolerance requested.

Concurrently he would request the secretary of agriculture to certify to the secretary of HEW that the pesticide was useful for its intended purpose and that the requested residue tolerance was in line with the amount of residue which is likely to result when the pesticide is used as proposed.

Within 90 days after the secretary of agriculture certifies the usefulness of a pesticide, the secretary of HEW would make a regulation establishing a tolerance for that pesticide. However, within this period, the person petitioning for the tolerance could ask to have the entire matter submitted to an advisory committee of scientific experts familiar with the problems involved. The secretary of HEW can submit the matter to the advisory committee when it is deemed advisable.

Members of the advisory committees are selected by the National Academy of Sciences and appointed by the secretary of HEW. The use of these committees as specified by this new amendment is an entirely new approach under this act to bring about a certain action on a technical question. These advisory committees, after studying the data which is submitted by the manufacturer and the secretary of HEW, would make recommendations of an advisory nature to the secretary who considers this report in establishing the tolerance.

Provides for Public Hearings

This Pesticide Residue Amendment also provides that anyone who is adversely affected by a tolerance issued under this procedure can request a public hearing on the matter. Any interested person may participate in this hearing. The hearing would be limited to issues in controversy at that time. The report of the advisory committee would become a part of the record at the public hearing. It would be conducted under the provisions of the Administrative Procedure Act. The record made at this hearing will become the basis for judicial review in the event that any interested person subsequently requests judicial review.

It may appear from the foregoing discussion that this new amendment applies only to products which are not now on the market. As is widely recognized there are many pesticides which are being sold at present without a formal tolerance having been established for them. The question arises at this point what happens concerning the tolerances for the pesticides presently being marketed.

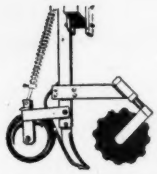
1950 Hearings Are Basis

It is our understanding that the Food and Drug Administration has prepared the technical information based on hearings held in 1950 for proposed tolerances of many of the presently-marketed pesticide chemicals. The release of these proposed tolerances can occur at any time and is then subject to review and alteration before the tolerances become final.

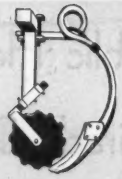
Under the provisions of the new amendment a grace period of one year is allowed during which raw agricultural commodities containing a pesticidal residue will not be adulterated under its provisions unless a tolerance has been officially established for that pesticide. This grace period can be extended for an additional year or until July 22, 1956, by the secretary of HEW.

It is anticipated that tolerances may be established for a wide group of chemicals prior to the expiration of this year on the basis of information in the hands of HEW. When these tolerances are established they will automatically become effective for those particular chemicals. The adulteration provisions of Section 402 (a) 2 of the original section remain effective until they are superseded by the provisions of the new amendment.

The foregoing procedures by no means exhaust the provisions of the new law, but are meant only to point out some of the salient features. This new legislation is the culmination of many weeks of meetings with members of interested groups—legislators, agricultural experiment station personnel, farm organization leaders, Food and Drug Administration officials and many others. It is evidence of real progress in the 'chemicals in foods" question from a legislative standpoint. The improved procedures mean greater protection to the safety of the public food supply and at the same time benefits to farmers and industrialists are enhanced. It is a practical piece of legislation under which all interested parties can operate. ◆



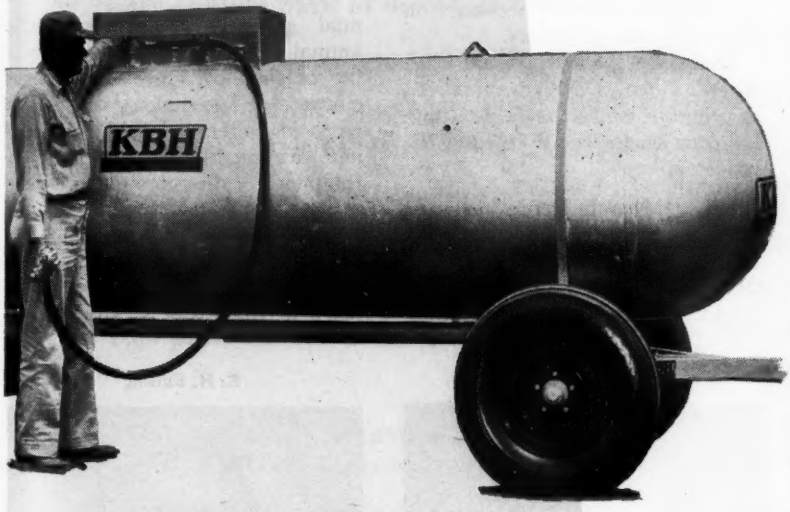
Coulter and Press Wheel Attachments



Any model KBH Universal Row Crop Applicator can now be quickly and economically converted to broadcast work with the addition of the new KBH Coulter and Press Wheel Assemblies. These attachments are built especially for ammonia application to pastures and small grains, but can be effectively used for row crop application as well. The scalloped coulter blade slashes turf and cuts stalks and stubble ahead of the applicator foot. Special swivel assembly prevents damage if unit hits obstruction and automatically swings back into position in front of applicator foot after turning. The press wheel, a 12" x 4" semi-pneumatic rubber tired wheel with adjustable spring tension, applies sufficient pressure for positive seal even in driest soils and at shallow depths. Row crop applicators with these KBH attachments will do the same job as an expensive, specially-built pasture applicator at a saving of from $500 to $600. The farmer also has a dual-purpose unit for both row crop and broadcast work.

Double your Fall Ammonia Application Business With These

2 New Additions to the KBH Line



AMMONIA TANK and TRAILER UNIT

Advanced design features of the new KBH Ammonia Tank and Trailer Unit make it far superior to anything on the market today. Extra features give more dollar for dollar value than you'll find in any other field transport, no matter what the price.

There's EXTRA CONVENIENCE! The open side of the tank fitting safety shield permits easy access to all fittings from ground level.

There's EXTRA STRENGTH! Fifth wheel, tongue and axles, coupling pole, hub and spindle group are all designed and built for longer lasting, trouble-free operation.

There's EXTRA SAFETY! Low to the ground construction with king pin and tank strap features, double the safety by reducing the danger of upsetting or putting excessive strain on the ammonia tank.

Add to these the special convertible feature that permits use as a general farm trailer and you'll see why we expect this to quickly become one of the feature attractions of the KBH line.

Illustrated literature and price lists are available on these new KBH units. Write today for complete information!

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KBH . . . The Leading Line of Ammonia Field Applicating Equipment

Public Health, Miller Bill & Miracle Drugs are topics for

NAC Spring Lake Meet

PUBLIC health, the Miller bill and miracle drugs will be among formal topics discussed at the 21st convention of National Agricultural Chemicals Association at Spring Lake, N. J., on September 8–10.

A scheduled address by David E. Price, M.D., assistant surgeon general, U. S. Public Health Service, has been termed "especially timely" by Lea Hitchner, NAC executive secretary, in view of the "increasing importance of insecticides in the public health programs of the world and the relationship of pest control chemicals to production of food."

Price is listed as one of the speakers to appear on the first day's program. Also included is a presidential address by Paul Mayfield, association head, along with a report by Hitchner on NAC activities for the year.

Another feature on the 8th will be a talk by Dr. Frank G. Jeter, information director of North Carolina State College School of Agriculture, on the public relations aspects of the pesticide industry.

Miller Bill Panel

The highlight of the second day will be a panel of association staff members and representatives of government agencies on the Miller bill, the pesticide residue amendment to the Federal Food, Drug and Cosmetic Act. This meeting should meet with special favor since its purpose is to aquaint delegates with the provisions of this new measure as they relate to the agricultural use of pesticides and the procedures made necessary in marketing such products.

Theme for the final session, with W. W. Allen, Dow Chemical co., as presiding officer, is "Up-to-date Information for the Success of the Industry."

'Miracle Drugs'

Two government officials, Dr. William R. Jester, assistant director, Division of Antibiotics, HEW and John C. Dunegan, principal pathologist, Agricultural Research Service, USDA, will present a discussion or the use of "Miracle Drugs" in agriculture.

Other features of this meeting will be addresses by W. R. Dixon of Dow Chemical Co. and E. H. Fallon, Coop. GLF Exchange. Dixon will speak on personnel training programs for industry and Fallon will discuss the farmer, industry's number 1 customer, and what he offers the industry. One more speaker, not yet announced, will round out the program.

Other activities include the annual golf tournament and the annual banquet on the 9th; a meeting of the board of directors for election of association officers, a reception for members and guests and election of three members of the board of directors for five-year terms for the 8th.

According to the official program, all sessions, including the banquet, are scheduled to take place in the Essex & Sussex. ●

David E. Price

W. R. Dixon

E. H. Fallon

NAC Convention Program

WEDNESDAY, SEPT. 8

"Where We Stand Today—and Tomorrow"
Presiding Officer: Paul Mayfield, president

Mayfield

10:10 a.m.
President's Address: Paul Mayfield, general manager, Naval Stores dept., Hercules Powder co., Wilmington, Del.

10:40 a.m.
Executive Secretary's Report: Lea S. Hitchner, executive secretary, National Agricultural Chemicals Association.

Hitchner

Price

11:00 a.m.
"Relationship of Pesticides to Health," David E. Price, M.D., assistant surgeon general, U.S. Public Health Service, Department of Health, Education & Welfare, Washington, D. C.

11:40 a.m.
"Telling Your Story," Dr. Frank H. Jeter, information director, North Carolina State College of Agriculture, Raleigh, North Carolina.

Jeter

6:30 p.m. Reception for members and guests.
8:00 p.m. Board of directors meeting, dinner.

THURSDAY, SEPT. 9

"How to Operate Under the Pesticide Residue Amendment (Miller Bill)"

10:00 a.m. PANEL DISCUSSION

Effects of the Miller Pesticide Amendment on the operations of the industry, government agencies, farmers, land-grant colleges and others, discussed by representatives of government agencies and industry.

Afternoon: Annual Golf Tournament

7:00 p.m. Annual banquet, Essex & Sussex Dining Room

FRIDAY, SEPT. 10

"Up-to-date Information for the Success of the Industry" Presiding Officer, W. W. Allen, manager, Agricultural Chemical Sales, Dow Chemical co.

10:00 a.m.

Jester

Dunegan

"Using Miracle Drugs in Agriculture," Dr. William R. Jester, assistant director, Div. of Antibiotics, Food and Drug Administration, Dept. of Health, Education and Welfare, and John C. Dunegan, principal pathologist, Agricultural Research Service, USDA, Beltsville, Md.

11:00 a.m.—to be announced.

10:30 a.m.
"Will Your Organization Wear Well?" W. R. Dixon, assistant general sales manager, The Dow Chemical Co., Midland, Mich.

Dixon

11:30 a.m.
"What Do You Know About Your No. 1 Customer—The Farmer" E. H. Fallon, assistant general manager, Cooperative G.L.F. Exchange, Inc., Ithaca, N.Y.

Fallon

Current views on

Fertilizer—Pesticide Mixtures

from '53 NAC Panel Members

A YEAR AGO, delegates to the 1953 NAC convention found most stimulating a panel discussion on fertilizer-pesticide mixtures moderated by L. Gordon Utter, Diamond Alkali co., and including M. D. Farrar, Clemson Agricultural College; C. C. Compton, Shell Chemical corp.; Eugene P. Ordas, Velsicol corp.; Charles T. Harding, Virginia-Carolina Chem. corp. and Rodney C. Berry, Virginia Department of Agriculture.

Interest in this subject continues to mount and, to help bring the Spring Lake discussion up to date, FARM CHEMICALS requested the panelists to state their 1954 views on the mixtures. We feel that you will find their comments of considerable interest.

Farrar's Views

Farrar

NAC members will recall that last year Dr. Farrar, now dean of the Clemson Agricultural College, remarked that "where pesticide-fertilizer mixtures are broadcast and worked into the soil by machines, they are extremely satisfactory.

"Control wise," Farrar added, "much work needs to be done in order to insure a uniform product that will be satisfactory to both the manufacturer and the producer."

This year the South Carolina educator, after pointing out that he has not been working directly on the program during the past year, wrote that he has "followed with considerable interest the development of the granulated insecticide formulation, both used directly without fertilizers and in mixtures with fertilizers. Both types of application have proceeded with unusual speed.

"Everywhere I go," Farrar continues, "I find new uses suggested for this formulation. As far as I am concerned, I feel that the formulation is a very satisfactory one and as time goes on, many new uses will be found for this material.

"As for the objection on the fertilizer manufacturer's part, for this particular formulation, I think the situation is about as last year . . . the difficulty is that of labeling, and when we add chemicals to fertilizer mixtures, they can in true form no longer be called fertilizers, but must be called mixtures of fertilizers and insecticides.

"This presents a very definite labeling problem, particularly on the part of the enforcement officer. I think, however, that sometime this thing will be worked out to the satisfaction of all groups. Certainly," Farrar concluded, "our farmers like these mixtures."

Comments by Compton

Compton

Representing the pesticide producer in last year's panel was Dr. C. C. Compton, who has prepared for publication in this issue the following summation of his current position:

"A year ago . . . we had an interesting panel discussion. . . . Since that time we have had an additional year's experience in the preparation and use of such mixtures. Use acceptance by the farmer has been notable. In 1953, in the 10 midwestern corn belt states, about 10,000 tons of insecticide-fertilizer mixtures were sold. It has been conservatively estimated that more than 75,000 tons were sold in this area in 1954. The total tonnage for insecticide-fertilizer mixtures in the United States as a whole for 1954 is believed to exceed 150,000 tons.

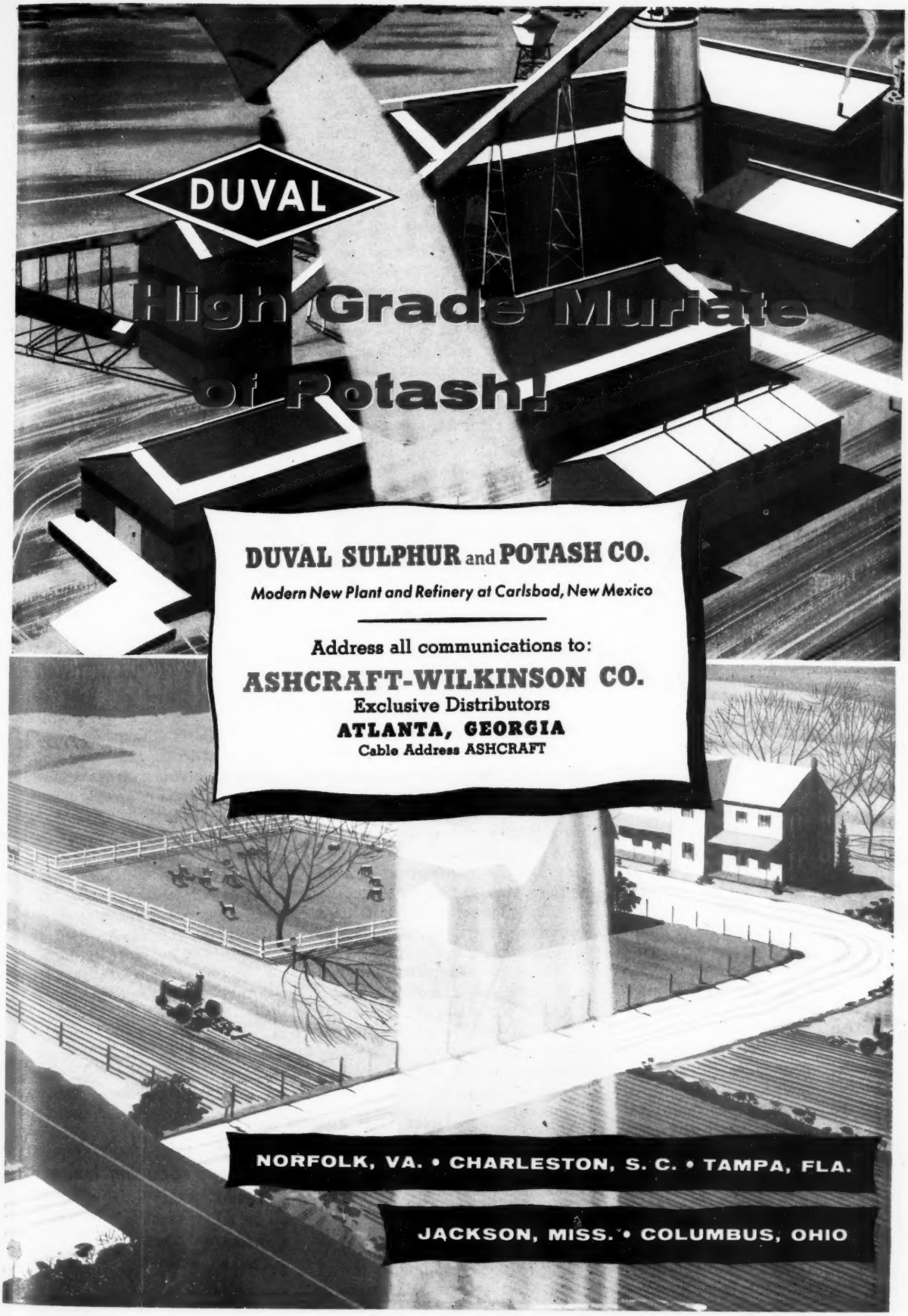
"Not only has the use of insecticidal chemicals in dry-mix fertilizers increased tremendously in the past year, but notable progress has been made in the use of insecticidal chemicals in concentrated liquid fertilizers.

"The manufacture, sale and use of insecticide-fertilizer mixtures has presented numerous problems, most of which have been solved. The effective control of soil insects by the use of these mixtures leaves little to be desired. The farmer has not experienced any unusual difficulties in their application. He is satisfied with the additional cost of the fertilizer when an insecticide is added. The safety in manufacture and handling of insecticide-fertilizer mixtures has been established.

"The stability of the more important soil insecticides has been determined. The fertilizer manufacturer has realized a substantial profit in the manufacture of insecticide-fertilizer mixtures. Last, but not least, the insecticide formulator has found a new market of significant proportions for formulations suitable for inclusion in fertilizers. In this market the surface has barely been scratched.

"That the insecticide-fertilizer mixtures have generally been satisfactorily prepared is evidenced by the fact that these mixtures have effectively controlled a variety of soil insects over a wide area and under varying weather conditions and soil types. Farmers and hybrid seed corn producers have pronounced this method of insect control highly effective.

"In the past year methods of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mixing insecticides in fertilizers have been greatly improved and extensive studies are underway that will lead to still further improvements. Better methods of sampling and analysis for regulatory purposes are in order. Since the insecticide-fertilizer mixtures have proven so widely satisfactory in insect control a better method of sampling such mixtures may be indicated."

Harding Lists Disadvantages

Harding

Because of his views as the fertilizer industry representative on the panel, C. T. Harding, general manager of V-C's Fertilizer manufacturing dept., precipitated the most comment from those attending the discussion.

Disadvantages to the fertilizer manufacturer, he said, include the differences in mixing the two materials, the lengthy time cycle required for a proper mix, the multiplicity of grades, toxicity of insecticides, high costs and a number of other factors.

Harding has found no reason, according to a recent letter, to shift his viewpoints although he is "quite sure that there have been more of these mixtures made during the past year than heretofore." He reports that, "although we do know of some sections where there has been a slight decline . . . we feel certain that the overall picture would show considerable increase in such mixtures, for the reason that many areas have tried little or none of this at the time of our . . . meeting.

"During the past year," Harding continues, "a number of these pesticides have been formulated in a granular, dustless form, which unquestionably makes them easier to handle and less dangerous for the personnel engaged in such an operation."

Despite this advance, he adds, "the statements that we made concerning the fact that the type equipment used in most fertilizer plants would be inadequate for proper mixing of insecticides still stands.

"We further feel that if any fertilizer company is going to put into practice the mixing of fertilizers and insecticides, it will be necessary to divorce . . . such an operation from the heart of its fertilizer operation and set up special equipment for both mixing and bagging to do the job on the proper basis.

"It has been our experience," states Harding, "with some of these insecticides that after a batch of goods has been make containing these materials, to follow . . . with regular fertilizer mixtures through the same machine is a rather dangerous practice, due to the carryover of some of these materials into the goods that are not supposed to contain these poisons."

Ordas's Review

Ordas

Eugene P. Ordas, of Velsicol's Market Development dept., has not been closely concerned with the development of farm chemicals during the past year; however, he has reviewed the situation pointing out that his comments are "interpretations of facts and observations gained throughout other departments of our company.

"It does appear" says Ordas, "that interest in and research for the development of fertilizer pesticide mixtures continues to grow, judging by the number of varied technical service inquiries received by our laboratories. It is the opinion of some entomologists that resistance to this type of mixture by the fertilizer manufacturers is disappearing as our fund of knowledge in the proper techniques for blending continues to increase.

"Of significant importance in this respect has been the improvements made in methods for the analysis of pesticides, particularly insecticides in various fertilizer-pesticide blends, thus making possible a much more factual appraisal of such factors as product compatibility, stability and uniformity.

"The availability of more reliable analytical techniques will make it possible to answer many of the disturbing questions raised in the past. The application of improved analytical techniques has shown that a study of compatibility of pesticides with carriers and conditioners of the fertilizer mixtures is also of primary importance.

"The increased popularity of liquid fertilizers has made necessary additional studies in formulation of water miscible pesticide concentrates. Although field studies on the application of pesticides with liquid fertilizer are now in progress, the results are not yet available for comment at this time.

"The advantages of using fertilizer-pesticide mixtures were clearly defined and generally agreed upon by members of the panel . . . last fall, however, certain difficulties in manufacture, compatibility, uniformity and storage life appeared to be the greatest drawbacks.

"With the advances now indicated in methods of analysis and technology, it is anticipated that the practicability of this new agricultural tool will be confirmed and former objections and fears dispeiled "

Ordas also pointed out that label approvals for these mixtures are being granted in steadily increasing numbers by both state and Federal authorities. Sample labels include the usual pesticide ingredient statement listing by name the active ingredients with total percentage inert; NPK analysis; warning statement; external and internal antidotes; directions for use and a list o, fertilizer ingredients acceptable for mixing with the pesticide.

Information from Berry

Berry

On the following pages, readers will find a summarization of material collected by Rodney C. Berry, Virginia state chemist, and disseminated by the National Fertilizer Association, relating to the fertilizer-pesticide mixtures situation.

Berry queried control officials in the USA, Canada and Hawaii regarding the situation in their respective areas.

FARM CHEMICALS has adapted this material for presentation in tabular form together with some pertinent comments from contral officials. Several states, not included in Berry's original survey, were queried by FARM CHEMICALS to provide readers with a more complete picture. ❖

State Fertilizer–Pesti

X = Yes
— = No comments
= No or no precedent
* = See remarks under state heading

	Alabama	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Florida	Georgia	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Massachusetts	Michigan
1. SALES. Are fertilizer-pesticide mixtures sold in your state?	X*	X*	*	X	X		X	X	X	X	X	X	X	X	X	*	X	X	*
2. REGISTRATION. Are these registered under your Fertilizer law?	X	X		X	X		X	X	X	X	X	X*	X	X	X	—	X	X	√
Pesticide law?		X		X	X		—		X					X		—	X	—	—
3. FEES. Do you collect regular fees under your Fertilizer law?	X	X		X	X		X	X	X	X	X	X	X	X	X	—	X	X	—
Pesticide law?		X		X	X		—		X					X		—	X	—	—
4. REGULATIONS. Have you issued regulations covering sale and distribution of these mixtures?						NO		X	X			X			X	—	X	—	—
5. PACKAGING. Do you require distribution in heavy paper containers? or do you		—			X	ANSWER		*		*	X	*	*	*		—		—	—
Permit sale in woven bags?	X	—		X	—		X	X	*			*	*		X	—	X	—	—
Permit bulk sale?		—			—		X				X	*	*		X	—		X	—
6. LABELING. Do you require a label showing: Fertilizer and pesticide ingredient statement?	X	X		X	X			X	X		X	X	X	X		—	X	—	—
Directions for use?		X		X	X				X		X		X	X		—	X	—	—
Warning statement?		X		X	X			X	X		X	X	X	X		—	X	—	—
7. RED TAGS. Is a 'red tag' warning required in addition to the above label?					X			X*	X		X			X		—		X	—
8. 'BUYERS MIXTURES. Do you permit "Buyers" or "Farmers Mixtures" where a farmer may have any pesticide added to his fertilizer by the manufacturer?	X						X		X	X	X	X	X	X	X	—	X	—	—
Are these subject to regulation under fertilizer and/or pesticide laws?		X		X	X			—	X		X	X	X	X	X	—	X	X	—

Based upon information collected by Rodney C. Berry, Virginia state chemist, and disseminated by the National Fertilizer Association. Several states, not included in Berry's original survey, were queried by FARM CHEMICALS to provide readers with a more complete picture.

Alabama. Very little has been sold. State official reports that manufacturers do not want, and have refused to make them. Two grades, 6–8–4 and 4–10–7, have been specifically mentioned.

Arizona. The one product registered is for lawn use, no requests for registration of other mixtures have been noted.

sticide Mixtures Survey

	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Canada	Hawaii
Maine	X	*	X	X*	X*	*	X	X	X	X*	X*	*	X	*	X	*	X	X	X	X	X			X		X			X	X	X	X
Maryland	X	√	X	X		—	X	X	X	X	X		X	—	X	X		X	X		X	X		X	—	X			X	X	X	
	X	—	X	X	—	X			X	X	X			—		X		X	X	X	X	X		X	—	X	X		X	X	X	X
	X	—	X	—	X	—	X	X	X	X	X		X	—	X	X		X	X	X	X	X		X	—	X			X	X	X	
	X	—	X	—	—	—			X	X	X			—		X		X	X		X	X		X	—	X			X	X	X	X
		—		—		—				*			X	—					X			X	X			X		—	X		X	
		—	*	—		—				*		—	*	—		—					X	X				X	*	—	X	X		X
	X	—	X	—	X	—	X		—	*	*	—	*	—	X	—		X		X				X	—		*	—	X	X	X	
		—	X	—	X	—	X			*		—	X	—	X	—	X	X		X				X	—		*	—		X	X	
		—	X	—		—	X		X	X	X	—		—		X	X	X	X	X	X	X	X	X	—	X	X	—	X	X	X	X
		—	X	—		—	X		X	X	X	—		—		X	—	X	X		X	X	X	X	—	X	X	—	X	X	X	X
		—	X	—		—			X	X	X	—	X	—		X	—	X	X	X	X	X	X	X	—	X	X	—	X	X	X	X
		—	X	—	X	—	—					—	X*	—		X			X			X	—		—			—	—		X	
		—	X	—	X	—	X	X	*	X	X*		X	—	X	X	X	X	X					X	X		X	—	X	X			
	X	—	X	—	X	—	—	X	—	X		—		—				X	X	X		—	—	X	X	—	X	—	X	X		

Arkansas. Sales are "probably not prevalent" but registration under both laws would undoubtedly be required.

Florida. Technical Regulation No. 5 covers pesticides which may be added to fertilizer mixtures. Although there are no restrictions on bags, paper units are recommended. A special "yellow tag" is required.

Georgia. A single fertilizer registration covers all insecticide mixtures therewith and a single insecticide registration covers all fertilizer mixtures therewith. Only tightly woven bags are permitted for packaging these products.

Idaho. One company in the state is reported selling such mixtures, mainly on a custom mix basis.

Indiana. Mixtures which will be registered: 7–11–5 with 2,4-D; 5–10–5 with 2, 4-D and 4–16–16 with aldrin. Rule No. 7 adopted by the state chemist under the Indiana fertilizer law regulates labeling and distribution of pesticides in ferti-

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lizers. There are no regulations or specifications that cover packaging.

Iowa. Only insecticides are fungicides are covered by law. There are no packaging requirements.

Kansas. Use of paper bags is recommended. Reported in the process of establishing pesticide tolerances.

Louisiana. Official reports that "there never has been any real interest in fertilizer-pesticide mixtures . . . none are sold, so any answers I would make would be hypothetical."

Maine. Registration permitted only on grades recommended by experiment station.

Maryland. Sales have been custom mixed products.

Massachusetts. Only one mixture, a lawn product, is sold in the state and there are no regulations regarding grade, pesticide, packaging or labeling.

Michigan. The new fertilizer law covering soil conditioners, minor elements, etc. will permit mixtures under Department of Agriculture regulations. No rules or regulations have been set up.

Minnesota. Pesticides may be included in any grade with properly labeled package if material is effective as claimed and not harmful to useful plant life. Although there is no record of bulk sale, it is permitted when accompanied by complete label. All distributors are reported using paper bags although there are no packaging restrictions.

Mississippi. There has been limited use for fertilizer-DDT mixes in white fringe beetle control and the state has allowed limited amounts of a mixture containing one-half per cent DDT to be distributed with a rubber stamp statement on regular fertilizer label.

Missouri. The first sale was recorded this spring and regulatory action is being considered.

Montana. Products registered under the Federal Act are acceptable for sale in this state.

Nevada. Regulations are being prepared under fertilizer act covering sale, distribution and labeling.

New Hampshire. Official reports that very little business is done in such products. No commercial mixers in the state.

New Jersey. A few non-agricultural mixes have been recorded (two in 1952 and 1953), none for agricultural purposes. The state agricultural experiment station does not recommend their use on agricultural crops, the entomology department does not feel it a proper way to control pests and the state control official concurs with this view. Since only special mixtures have been sold no regulations have been issued although the buyer must furnish state chemist requests for special mixtures on forms provided.

New Mexico. Mostly specialty items have been marketed, and those have been in paper bags. This official, too, takes a dim view of fertilizer-pesticide mixtures.

New York. Three brands have been registered for lawn use, none for agricultural crops.

North Carolina. No fertilizer grades are specified but pesticides which are allowed include aldrin, dieldrin, chlordane, DDT, heptachlor and toxaphene. Recommendations would be against sale in woven or fabric bags. Warnings must be printed on red tags which are supplied by the manufacturer and printed according to regulations. "Buyers mixtures" are not recommended or encouraged but there is no prohibition of them.

North Dakota. None sold for agricultural purposes.

Ohio. Require labeling under fertilizer law only.

Oklahoma. Registration and regular fees under both laws will be required. None have been mixed yet in this state.

Oregon. Dual registration required under present law but plan to wait this year before requiring registration. Sales to date classed as custom mixes and not subject to the law.

Pennsylvania. There are no restrictions on mixtures.

South Carolina. No definite fertilizer grades specified; chlordane, heptachlor, aldrin and toxaphene are principal insecticides used. Red tag showing insecticide content must be attached to bag and serves to a limited extent as a warning. All mixtures sold on a "Buyers mixture" basis.

South Dakota. No grade restrictions, action pending.

Tennessee. None recommended by experiment station and no registration requests received. Registration would be required under both laws and officials plan to follow the resolution adopted by the southern control officials group.

Texas. None registered, all applications refused. State chemist and experiment station agree that they should not be sold.

Utah. No grade limitations, no packaging rulings.

Vermont. None sold in this state.

Virginia. Has a restricted list of approved fertilizer grades. Experiment station recommends for use on peanuts in Southern corn root worm control only grades 0–14–14, 0–10–20 and 2–12–12 containing eight pounds of aldrin or heptachlor per ton.

Washington. When mixed together the economic poison law would govern the product.

West Virginia. Very limited amount sold in this state.

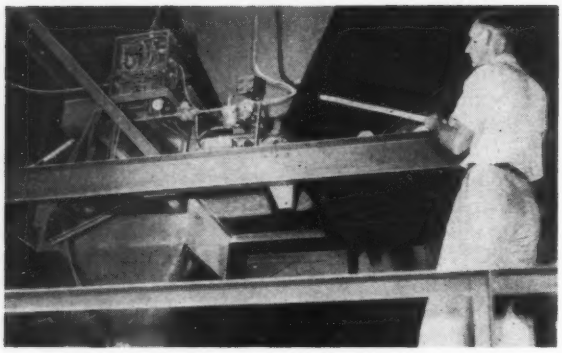
Wisconsin. No specifications on grades.

Wyoming. No limitations at present, very little sold. No action taken on packaging.

Canada. Only one on market (2–16–6 with 0.5 thiram) and demand is termed light. ◆

New I & C Bagger Installed

Increases Output At Dixie Guano's Laurinburg Plant



Dan Jones, Dixie Guano's asst. supt., points to the extra vibrator which was added to maintain even flow of fertilizer from feed hopper to bags.

By Dick Brown

A NEW, fully automatic bagging unit, placed in operation last February, is playing a major role in operations at the Dixie Guano co. plant in Laurinburg, N. C.

The unit, manufactured by Inglett and Corley of Augusta, Ga., has already proven its value in speeding up production, and has won high praise from C. L. Durham, plant superintendent, and other Dixie officials.

Outstanding Feature

Greater speed with less manpower is the bagger's outstanding feature in the eyes of Durham, "It has enabled us to up production to 55 to 60 tons of fertilizer per hour as compared to 35 to 40 tons in the past," the plant superintendent pointed out, "and we've been able to do it with one man instead of three."

In the way of production, the I-C bagger, with a top notch operator, turned out, or filled, an average age of 11 to 12 two-hundred pound burlap bags per minute during Dixie's spring rush season. That's peak production for this size bag, according to Durham, because that's about as fast as the automatic scales can weigh the fertilizer, and the gates feed it into the hopper.

The average on 100-pound paper bags runs around 16 to 17 per minute, Durham added, and that's as fast as a man can get bags under the spout.

"With one man bagging, another sewing, and a third loading," the plant superintendent said, "the I-C is as fast and efficient a bagger as I've ever encountered. We've ironed out a minor kink or two since putting it in operation early in the year, but on the whole I'd say performance has been little short of sensational."

Minor Problems & Solutions

In the way of minor problems, Durham referred to an occasional slight weight variation encountered in the changeover from one analysis to another, and uneven feeding from the hopper on certain grades.

The problem of uneven feeding was solved with the addition of another vibrator on the hopper. The unit came equipped with a single vibrator, and, as a result, some grades would tend to stick to one side of the hopper. Another vibrator on that side now keeps the flow equal under all conditions, and will probably become standard equipment on future models.

"Actually," the plant superintendent said, "there's no problem regarding weight variation. Anytime there's a changeover in analysis, the consistency is usually different, and that means the automatic scales will naturally vary slightly. We check weigh by hand every 20 bags anyway, so it's a simple matter to readjust the scales to compensate for any variation. Let me emphasize that this in no way detracts from the overall operation of the bagger."

Bagger's Operation

The I-C bagger is relatively simple in operation. Payloaders feed the bulk fertilizer to an elevator inlet which transports it through a screen and into a hopper above the automatic scales, which can be set for weights from 80 to 200 pounds.

Solenoid units control air valves, which operate a system of internal gates, which in turn govern the flow of fertilizer into bags. Every step is fully automatic from the time the payloader dumps bulk fertilizer onto the elevator until it feeds into burlap or paper bags.

In the way of upkeep, the bagger requires occasional oiling with a very fine machine oil to keep the air cylinders well lubricated.

"The Inglett-Corley unit has fitted into our scheme of operations perfectly," Durham said. "We've noted no spillage while filling bags, and with the addition of the second vibrator we've encountered a steady, even flow of fertilizer with no dribbles."

The bagger installed at the Dixie plant was one of the first produced by Inglett-Corley, and has been closely inspected on numerous occasions by other manufacturers in the two Carolinas seeking ways to streamline operations. ◆

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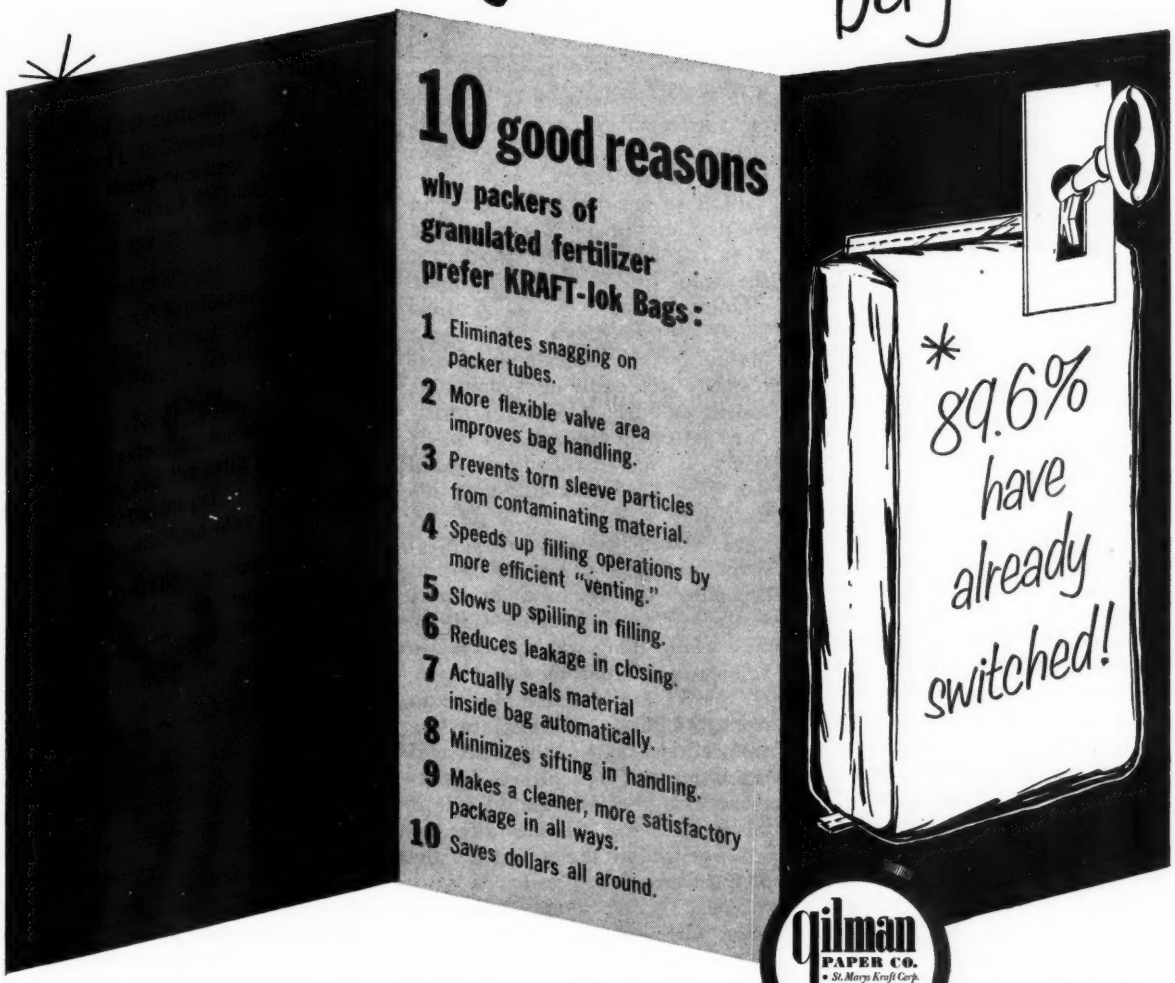
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Grain Sanitation

New Program May be Near

Secretive Report Reviewed

Once again grain sanitation is a prime subject of conversation with a closely guarded advisory committee report now before the secretaries of USDA and HEW. FARM CHEMICALS **Washington editor, John Harms, reports on the current situation, including committee recommendations. Rounding out the picture are exclusive statements of spokesmen for industry and government.**

By John Harms

THE government is getting set to try another nationwide grain sanitation program. Its last attempt to get an effective clean-up job going more than a year ago fizzled under heavy pressure of various segments of the grain trade. But there now are signs that Federal officials charged with protecting the health of the consuming public are dead serious about getting a program started and making it stick. Rising consumer clamor for cleaner flour is spurring them into action.

Program's Aims

The program, to be announced shortly, is aimed at cutting down on insect and rodent filth found in small grains, mostly wheat going into flour. Any program for cleaner grain, no matter how mild, would stress greater use of pesticides to kill insects and keep rats out. While it's not probable that the program will start out as a big, dramatic crack-down on handlers and millers, the planned intensified "clean grain" educational program will point to the effectiveness of chemical pesticides, as well as to sound construction of storage bins and accepted storage and transportation practices.

Impact on demand for pesticides will become particularly apparent as the threat of Food & Drug Administration seizure of infested or contaminated grain shipments is brought more to bear on grain trade and farmers.

FDA policy on cleaner grain in the past has been one of cooperation with the grain trade—to permit the trade to do as much house cleaning on its own as possible before getting tough. And, as a matter of fact, considerable progress has been made in cleaning out rodent manure. Under the short-lived get-tough program of 1952–53 relatively few car-loads of grain had been seized because of undue filth.

FDA launched a rodent control drive in the fall of 1952 and scheduled the start of an insect control program for July 1, 1953. The whole thing was called off in the spring of 1953 by direct order of the White House. Big grain operators said they stood to lose tremendously by the scheduled crack-down. Agriculture department also was anxious to call it off because of probable affect on its large wheat take-over under the support program.

These conflicts are still very much alive today and will dictate to some measure the kind of sanitation program eventually decided upon.

About a year ago, the departments of Agriculture and Health, Education and Welfare (of which FDA is a part) jointly set up an industry-government-college grain sanitation advisory committee to study the problem and come up with specific recommendations for an acceptable program.

This 17-man committee made its report last July to Agriculture Secretary Benson and HEW Secretary Hobby. It has been kept under a tight cloak of secrecy—to give the secretaries an opportunity to work up an agreement on what Federal policy on grain sanitation should be. This policy, which is expected to give direction to the grain clean-up program, will be announced this fall.

Lack of a clear-cut policy in 1952–53 played hob with the grain trade—which lived under the fear of FDA seizure without knowing precise conditions under which grain would be condemned for human use.

Unsettled Differences

The Advisory committee's report to the secretaries indicates that some basic differences between various interests within the grain trade itself have still not been settled. One of these, which amounts to a big obstacle to an effective clean-up campaign, revolves around who should do the cleaning up. Millers, who for many years have been subject to FDA inspections, believe grain dealers should do more.

Dealers and other grain handlers maintain the logical place for government inspection and enforcement activities is in the flour mills. This and other points of disagreement are likely to be excluded from the joint secretarial statement and left to the committee for further study.

The joint policy statement will

be based on the findings and recommendations of the committee, although to the extent disagreement inside the trade goes unresolved, the committee's help in setting policy may be considered negligible by the secretaries. The Advisory committee's closely-guarded report makes several major recommendations, all of them important to the farm chemicals industry. They are

1. An intensified education program should be launched on all levels from the farm to the last handler. Owing to the widespread educational facilities of the Cooperative Federal-State Extension Service, this agency will have main responsibility for initiating and coordinating such a program. All farmers, handlers, warehousemen, millers and bakers will be asked to cooperate.

2. Clean-up campaign on rodent pellets—to start "as soon as practicable." The committee makes no recommendation as to when this part of the program should be launched, except to indicate a high priority for it. It also steers clear of suggestions on how the program should proceed. Belief is that operational procedures are in the FDA domain.

There's some sentiment within the advisory committee for a program involving FDA tolerances on the amount of rodent pellets permitted in grain travelling interstate, and the use of chemical repellents mixed in with the grain.

FDA's present rat manure tolerance calls for seizure of a carload if a sample shows one pellet per pint. USDA estimates wheat and other cereal grain losses due to rodent damage and befouling at more than 41 million bushels per year.

3. Insect infestation cleanup. The committee makes no recommendations as to when this should be started, nor on how it should be operated. Food & Drug also has tolerances on the shelf for this, but has been told to keep them there during the past two years. FDA basis for legal action before seizure of infested grain originally involved a certain number of "exit holes" in grain in a small sample taken at random. This later was eased somewhat. The USDA estimates that upward of 60 million bushels of wheat are lost annually to stored-grain insects.

4. Weevils. The report describes the difficulty in detecting eggs in grain. It recommends further research into methods of detection.

The committee shied away from the obvious likelihood that some chemicals of high toxic potential to man might be required to control infestations in some cases. It feels that this is an FDA matter—to determine whether tolerances would be needed and if so to propose them.

New Food & Drug Administrator George Larrick told FARM CHEMICALS he is concentrating on the grain sanitation program—is "pushing hard for it." He says, however, the FDA is not particular about what kind of program is undertaken, "just so long as a program is launched which eventually will clean up the grain situation." ◆

Randall Latta

head, Stored Product Insect Section, USDA and chairman, Departmental Committee on Insect- and Rodent-Damaged Grain

THE Department of Agriculture has been interested for many years in the control and prevention of insect damage to stored grains, and has done a tremendous amount of research on this subject. This research has the same objective as the current grain sanitation program: To prevent the loss or contamination of grain due to insect attack and to promote good management practices so that grain will arrive on the market in good millable condition.

The recent program of the Food and Drug Administration with its enforcement provisions ran into some problems of grain management and resulted in these enforcement aspects being temporarily set aside on April 30, 1953, to permit a thorough study by a 17-man committee representing the Government, the grain trade, land-grant colleges and the general public. This committee has completed its study and its report is under consideration by the Secretaries of Agriculture and of Health, Education and Welfare.

In the meantime, the research and educational activities in the Department of Agriculture related to insect control in stored grain have been stepped up. Several new publications have been issued: "Insects in Farm-Stored Wheat," USDA Leaflet No. 345; "You Can Store Grain Safely on the Farm," USDA Farmers' Bulletin No. 2071; "Causes of Outbreaks of Stored-Grain Insects," North Central Regional Publication No. 35 (cooperative between the North Central States and USDA); "Control of Stored-Grain Insects in the North Central States," North Central Regional Publication No. 49 (cooperative between the North Central States and USDA) and "Insect Control in the Country Wheat Elevator," Bureau of Entomology and Plant Quarantine Publication EC-24. Also, many of the states and farm and trade groups have continued research and educational activities on grain sanitation programs.

Other informational material, in the form of strip films, press stories and photographs, has been widely disseminated through the Cooperative Agriculture Extension Service. The Office of Information of the USDA has utilized the back page of several USDA bulletins to urge farmers to protect their grain from insects and rodents.

Industry-Government Films

The way is now being cleared for trade associations, crop improvement associations and other nonprofit organizations to participate with the department in producing films on insect and rodent control in stored grain, better management of grain storage and agricultural subjects. This is being accomplished through

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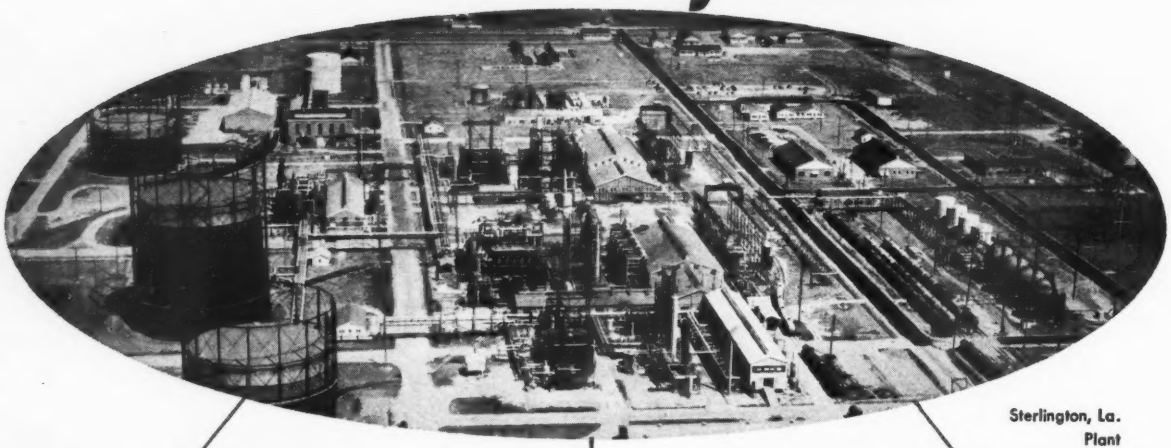

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a revision of USDA policy to permit motion picture films to be produced in cooperation with reputable nonprofit organizations outside the Government.

The Agricultural Marketing Act Advisory committees on grain, rice and feed and forage recognized as early as 1952 that a grain sanitation program would raise many questions of procedure that only research could answer. These committees joined in recommending an expansion of research on stored grain insects. Congress appropriated additional funds for this purpose in the 1954 session and research activities are now being strengthened.

The research program has brought forth many advances which will directly strengthen attempts to improve the sanitary condition of grain stocks. New methods of detecting hidden infestation and of separating infested from noninfested grain have been developed and are now being evaluated to see if they are suitable for the use of grain handlers. Improved methods of fumigation are on the way, particularly the possibility of using forced circulation in grain elevators, which may result in reduced cost and greater efficiency. The possibility of applying protective dusts and sprays to stored grain is under extensive investigation.

Even though it is not possible at this time to speculate on what the Government policy will be in relation to an enforcement program, there is no doubt that work for better sanitation of stored grain will be continued. ◆

Herman Fakler
vice president
Millers' National Federation

FLOUR millers have the high privilege of producing a basic food product. This involves the obligation not only of maintaining the highest standards of sanitation in their grain elevators and their flour mills, but also maintaining the highest quality standards in their principal raw material, wheat, and the grain food products made from wheat. Flour millers willingly accept this obligation.

Flour millers also have an obligation to the producer of wheat to provide an effective and profitable market for his product as good human food. They have an obligation to the consumer to produce a nutritious and clean food. They have an obligation to the Government to observe the requirements of the Federal Food, Drug and Cosmetic Act, the law designed to protect the consumer. Flour millers willingly accept these obligations.

They believe that wheat producers as well as the handlers of wheat grain must also accept their fair share of these responsibilities and obligations.

This is the fundamental position of the wheat flour milling industry of the United States with respect to the much-discussed grain sanitation program.

Flour millers were and still are in complete accord with the objectives of the Federal Food and Drug Administration in carrying on a constructive and positive program designed to improve the condition of wheat delivered to the mills for processing into human food. The milling industry feels that a very serious mistake was made and a long step backward was taken when this program was abandoned in 1953 by joint action of the Secretary of Health, Education and Welfare and the Secretary of Agriculture.

Wheat is a human food, and when offered for sale for such purpose, it must be in proper condition and free from objectionable contamination.

Flour millers believe that wheat which is unfit for human consumption by reason of insect or rodent contamination should not be offered for sale as such by anyone, nor should it be permitted to be commingled with sound, clean wheat. It should be diverted to animal feed or other non-food uses.

Having in mind the importance of preventive measures for the control of insect and rodent contamination, flour millers believe much effective work can be done through active and dynamic educational programs beginning with the wheat producer and continuing through all the various phases of wheat handling and processing. Current efforts along this line by producer organizations, industry groups, wheat improvement associations, state agricultural colleges and state and Federal extension services are highly commendable.

It must be recognized, however, that education in this field is necessarily a slow process. There is widespread conviction that a program of education to be most effective must be backed by economic incentives.

It would appear to be quite feasible and practicable to include in the United States Official Grain Grades for Wheat, as administered by the Department of Agriculture, factors for both rodent and insect contamination satisfactory to meet the requirements of the Federal Food, Drug and Cosmetic Act. Wheat containing contamination in excess of the factor included in the wheat grades would be graded "sample grade," and purchasers would thereby be on notice that such wheat does not meet acceptable standards of sanitation for human food.

This procedure would provide the necessary economic incentives to promote the maximum utilization of control measures and materials at all levels. ◆

Dorr D. Green
chief, Branch of
Predator & Rodent Control
Fish & Wildlife Service
USDI

THE grain sanitation program has been helpful in creating an awareness of the need for careful handling of agricultural products that are used as human food. This recognition has in turn stimulated local interest in projects for the control of rats and mice. As an example, last year a Kansas county, in enumerating projects needed by the county, listed rat control as second in importance—next to the need for improved roads.

Rodent control on farms has become a popular ac-

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tivity for farm youth groups. About 15,000 4-H and FFA members in the Dakotas and Minnesota are enrolled in a clean grain program, and it has been estimated that the number will total 25,000 by this fall. Reports on results of one such project (a county in Kansas) recently indicated the county was 92 per cent rat-free. These are all definite signs of progress in the Nation-wide movement toward cleaner food.

It is anticipated that future effort in this work will be concentrated on the strengthening of educational phases of the grain sanitation program. In other words, the activity will be based on a philosophy of voluntary cooperation and the belief that most grain handlers will correct an undesirable situation once they become aware of it. Should such efforts prove inadequate, there is a strong possibility that some form of penalty may be imposed on grain handlers for possessing dirty grain.

Two major obstacles must be overcome to assure attainment of the clean grain objective. One of these concerns data which indicate that only a small percentage of those handling grains intended for food purposes are responsible for upwards of 90 per cent of the rodent filth which eventually contaminates much of the total supply. It is essential that these few careless people be made aware of their responsibility to the agricultural industry and to the entire populace of the country to eliminate filth from their products.

The second important factor is the need for sustained effort to maintain the desired standards of cleanliness. Rats cannot be permanently controlled by overnight campaigns. They must be attacked on a continuing basis; otherwise their numbers soon increase to former levels. Fortunately, the modern anticoagulant poisons are ideal for year-around control. Placed in permanent feeding stations at strategic locations around farm buildings and food plants, they destroy resident populations of both rats and mice, and also kill off others which migrate from surrounding areas.

We need much wider application of this technique. Applied along with improved sanitation practices and better storages, these chemicals can help make rodent-free communities a reality. ◆

W. W. Allen
NAC vice president and manager, Agricultural Chemical Sales
The Dow Chemical Co.

MORE and more grain is being stored by farmers on their farms. That is the most important fact facing the farm chemicals industry as it takes part in the stepped-up drive for cleaner grain. That also is the most important fact to Government agencies and others who are working for better grain sanitation. It locates the point where effort must be directed.

Grain sanitation is a two-fold problem to the farmer. In many producing areas, grain comes into storage from the field already infested by insects. However slight this damage may be, it represents a toe-hold for injury which must be controlled, or it will increase and spread. If the way is opened by this primary infestation, secondary insects which may do far greater damage usually follow.

The other aspect of the problem is that on many farms grain storage facilities are infested with carry-over eggs or growing insects. They are hungry for grain coming into storage.

Control of these pests to keep stored grain clean must be coupled with good housing conditions and effective rodent control.

Chemical control of stored grain insects, however good, will be of little value if other pests move in and injure the grain. Therefore, while it is not the direct duty of the farm chemicals industry to promote rat-free premises, good roofs and bird-tight windows, it is in the interest of the industry to press for these factors.

More directly related to our industry is the problem of sanitation within the grain storage bin. Old grain, feed bags and other possible sources of infestation should be cleaned up. Housekeeping in and around the storage facilities should be good. A residual spray should be applied to walls, floors and other parts of the structure where surviving insects may lie in wait for the new grain to arrive.

Control of Primary Infestation

It is important also to get and keep control of the primary infestation which is so often brought in from the field. For this, chemical control is the only feasible answer. Fumigation is one approach which many farmers use. A modern grain fumigant, properly used, can destroy all life phases of all insects in the grain in storage, at any time when temperatures of the grain mass are high enough to permit proper distribution of the vaporizing fumigant.

Grain protectants are also used by many farmers. These are applied when the grain is being put into storage. Good control with protectant dust depends upon uniform distribution of the dust in the same way that good control with fumigants depends upon good distribution of the fumigant vapors. It is often possible to apply protectants during mechanized handling of the grain.

Farmers must also follow up these protective measures. Despite the best of care under farm conditions, new infestations may break out in time. Detecting them early permits simple control.

Sales efforts must be geared throughout to reach the farmer market if we are to render maximum service and gain maximum advantage from this. Packages must be of farm-use size, label instructions must be in terms of farmer problems. Distribution must make chemicals available to the farmer where he lives.

This does not mean that sanitation at the level of the terminal elevator or processing plant is unimportant. Rather, it indicates that in most instances these concerns already have excellent insect control. Their operators usually come under closer supervision.

The big challenge and the big opportunity for the farm chemicals industry to promote better grain sanitation appears to be in chemical control of insects in grain stored by farmers on their own farms. ◆

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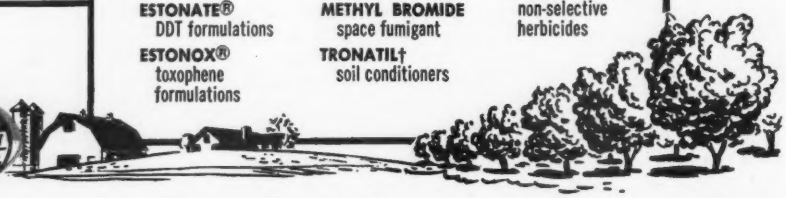

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Influence of Surface Active Agents in Superphosphate, Mixed Fertilizer Production

By E. J. Fox, J. O. Hardesty, and Rikio Kumagai

Fertilizer and Agricultural Lime Section
Soil and Water Conservation Research Branch
Agricultural Research Service, USDA

THROUGH collaboration with the officials of a chemical fertilizer company the authors were permitted to observe and participate in the execution of plant-scale tests to determine the influence of anionic and nonionic type surfactants on the acidulation of phosphate rock and on fertilizer mixtures prepared from the surfactant-treated superphosphate.

An attempt was made to determine such influence on both physical and chemical properties of products in factory-scale tests all the way from phosphate rock acidulation through to bag storage of the final mixed fertilizer.

In recognition of the wide current interest in the use of surface active agents in fertilizer preparation, the host company has kindly consented to publication of a brief description of the experiment and the results obtained.

Materials and Factory Procedure

The phosphate rock used was double-floated Florida land pebble 75 per cent B. P. L. concentrate, factory ground to the specification, 85 per cent through 100 mesh and 60-65 per cent through 200 mesh (wet screen). The chemical and screen analyses, respectively, of samples of the rock taken during test operations are given in Tables I and II.

The rock was acidulated with virgin sulfuric acid at the rate of 82 pounds of 56° Bé (71 per cent) acid, equivalent to 58.2 pounds of 100 per cent H_2SO_4 per 100 pounds of rock dust. Factory produced 60° Bé acid was diluted in 25-27 ton-lots as used and fed to the mixing pan at about 135°F.

The surfactants used were an anionic-type alkyl naphthalene sodium sulfonate and a nonionic-type condensation product of tridecyl alcohol and ethylene oxide. The anionic surfactant was added to the acid in the acid-cutting tanks previous to its admixture with the rock.

An attempt to follow the same practice with the nonionic surfactant led to operational difficulties due to excessive frothing of the surfactant-treated acid solution in the metering tank. Consequently, after the first tankful of the surfactant-treated acid was used up, the nonionic surfactant was added to the rock-acid mixture in the mixing pan. The surfactants were added at the rate of 0.5 pound of active ingredient per ton of superphosphate.

One-ton batches of superphosphate were mixed in 2-ton-capacity pans, which provided ample room for the extra bloat produced by the nonionic surfactant. The 75-ton capacity dens were excavated by dragline immediately after being filled and the superphosphate was conveyed by elevator and overhead dumpcar to the curing piles. Control and treated materials consisted of 225-450 ton lots.

Samples of the superphosphate taken about three feet below the surface of the piles at one week intervals starting 24 hours after mixing, were immediately analyzed for total, water-soluble and citrate-insoluble phosphate, free acid and moisture contents. Pile temperatures observed at the time the samples were taken were also recorded. Results of these observations are listed in Table III.

After six weeks curing in the piles the superphosphates were processed into mixed fertilizer. At that time the hardness of the superphosphates was measured by determining the rate of vertical penetration of a ½-inch star drill under pressure of the weight of the electric hammer into undisturbed material in the pile at an elevation of about four feet above floor level. The results of these tests are given in Table IV.

In the formulation of the fertilizer mixtures conditioning agents other than the surfactants were purposely omitted. The materials used in the formulation are shown in Table V. Table VI shows the analyses of composite samples of the mixed fertilizers taken during mixing operations.

The mixed fertilizers were stored in bins and portions withdrawn for bagging two, three, eight and 16 days after mixing. The bagged material in 100-pound asphalt-laminated four-ply paper bags was stored in tiers 10 bags high. The tiers were separated by six inches of free air space.

At the end of two, four and eight week storage periods the first, fifth and ninth bags, counting from the top of the pile, were examined for bag set. Each bag was dropped four times from waist height (about three feet), once on each edge and side, and its contents poured out on a two-mesh box-type screen. The material retained on this screen expressed as weight per cent of the total, is recorded in Table VII.

Discussion of Results

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Table I. Chemical Analyses of Phosphate Rock

Sample	% CaO	% P_2O_5	% F
A	48.10	34.56	5.05
B	47.96	34.52	5.04
C	47.92	34.61	5.07
Average	47.99	34.56	5.05

Table II. Screen Analyses of Ground Rock

Sample	Per cent Passing Tyler Screen				
	60-m.	100-m.	150-m.	200-m.	200-m.
	Dry screen				Wet screen
A	97.1	86.3	73.9	57.9	63.2
B	97.0	84.3	71.9	52.7	62.5
C	97.8	86.0	74.7	54.3	67.3
Average	97.3	85.2	73.2	54.6	64.4

except that certain organic compounds and conditioning agents were purposely omitted, was doubtlessly superior to similar mixtures prepared from superphosphate made with nonfloated rock (*1*, *2*). Consequently, the room for improvement by surfactant addition was probably less than it might otherwise have been.

The anionic surfactant retarded the rate and the extent of the reaction between the rock and acid during mixing, denning and curing (Table III). It flattened the charge in the mixing pan and produced a harder (Table IV), denser superphosphate. In the mixed fertilizer it was effective in reducing bag set in under-cured mixtures bagged two and three days after mixing (Table VII).

From the nature of these results, it appears that its effect was more physical than chemical. Such behavior may be attributed to a surface coating of the rock and superphosphate particles with the acid-incompatible organic anion that separated as a tar-like substance when the surfactant was mixed with the acid. From this test it may be concluded that use of the anionic type of surfactant in the acidulation of double-floated rock is not indicated.

The nonionic surfactant slightly accelerated the rate and extent of the reaction between rock and acid over a period of three weeks storage. The lower phosphate conversion appearing after six weeks storage (Table III) is doubtlessly due to the inclusion of an appreciable amount of underacidulated superphosphate in the composite sample caused by excessive frothing of the surfactant-treated acid. Only one tankful of acid (about 25 tons) was so treated. The superphosphate made with this acid was at the bottom of the

Table III. Analyses of Superphosphates in Curing Piles

Curing time	Pile temp.	H_2O[1]	T. P_2O_5	Avail. P_2O_5	Phos. conv.	Free acid[2]
Days	°F	%	%	%	%	%
			Control			
1	181	8.75	20.00	18.72	93.6	2.62
8	190	8.05	20.20	19.20	95.1	2.20
15	167	7.90	20.20	19.37	95.9	1.96
22	151	7.75	20.50	19.75	96.3	2.20
42[3]	—	7.30	20.25	19.62	96.9	1.62
			Anionic Surfactant			
1	182	8.95	20.15	18.07	89.7	3.43
8	184	8.65	20.40	18.95	92.9	1.96
15	178	7.35	20.70	19.32	93.3	1.83
22	173	6.70	20.65	19.45	94.2	1.59
42[3]	—	7.35	20.25	19.17	94.7	1.59
			Nonionic Surfactant			
1	160	9.25	19.93	19.00	95.3	3.06
8	167	9.30	20.05	19.32	96.4	2.57
15	159	8.35	20.00	19.47	97.4	2.20
22	160	8.50	20.00	19.85	99.3	1.96
42[3]	—	7.70	19.90	19.25	96.7[4]	1.59

[1] A. O. A. C., 105° C.
[2] Expressed as % H_2SO_4.
[3] Composite samples.
[4] Includes underacidulated super at bottom of pile.

Table IV. Rate of Drill Penetration of Cured Superphosphate, Inches/Minute[1]

Test No.	1	2	3	4	5	Ave.
Control mixture	48.0	50.5	50.5	50.5	48.0	49.5
Anionic surfactant	34.3	32.0	26.7	48.0	48.0	38.1
Nonionic surfactant	43.6	41.7	40.0	43.6	41.7	42.1

[1] Measurements made after 6 weeks in curing pile.

Table V. Formulae of 5–10–10 Fertilizer Mixtures

Ingredients of mixture			Plant nutrients		
Material	% Nutrient	Lbs/T	% N	% P_2O_5[1]	% K_2O
Superphosphate	19.7	1041[2]		10.25	
Muriate of potash	60.9	336			10.23
Ammonium sulfate	20.7	182	1.88		
Nitrogen solution	40.6	120	2.44		
Anhydrous ammonia	82.3	20	0.82		
Dolomitic limestone		118			
Water		40			
Sand		188			
Total		2045			
Weight loss on mixing		45			
Net		2000	5.14	10.25	10.23

[1] Based on available P_2O_5 in superphosphate
[2] Control superphosphate mixture. Weight of superphosphate and sand in other mixtures adjusted to yield the same percentage of available P_2O_5.

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pile, whereas the material made by adding the nonionic surfactant to the charge in the mixing pan was on top of the pile.

Samples taken from near the top of the pile during the first three weeks were representative of the latter, whereas the composite sample taken during the fertilizer-mixing operations was representative of the whole pile, including the under-acidulated superphosphate. This also may have accounted for low available phosphate in the mixed fertilizer made with the nonionic surfactant-treated superphosphate (Table VI), which mixture was formulated on the basis of available P_2O_5 in the sample taken at the three week curing period.

It is unfortunate that the off-grade superphosphate made with the nonionic surfactant-treated acid had to be placed in the curing pile, but there was no other space available for dumping it.

It also appears that the nonionic surfactant was effective in increasing ammonia retention during ammoniation. The difference between the nitrogen contents of this and the control mixture, though small, is equivalent to 2.9 pounds of ammonia per ton of fertilizer or 5.7 per cent of the 51 pounds of neutralizing ammonia added.

The influence of this reagent on the caking tendency of the superphosphate (Table IV) and of the mixed fertilizer (Table VII) was negligibly small. A slight increase in hardness of the superphosphate was offset by a slight decrease in bag-set in the mixed fertilizer.

Table VI. Analyses of Composite Samples of Mixed Fertilizers

Treatment	P_2O_5			N	K_2O	H_2O[1]
	Total	Cit.-insol.	Available			
	%	%	%	%	%	%
Control	10.50	0.40	10.10	5.07	10.11	5.55
Anionic	10.80	0.60	10.20	5.11	9.58	5.35
Nonionic	10.00	0.45	9.55	5.19	10.54	5.25

[1]A. O. A. C., 105° C.

SUMMARY

Plant-scale tests on the use of 0.5 pound of surface active agent per ton of superphosphate in fertilizer preparations show that the anionic type added during the acidulation of double-floated Florida land pebble phosphate rock reduced the rate and extent of the reaction between the rock and acid over a period of six weeks storage in the curing pile, flattened the charge in the mixing pan and den and thereby produced a harder and denser superphosphate.

These effects are attributable to surface coating of the rock particles with the acid-incompatible organic anion which separated as a tar-like substance upon addition of the surfactant to the acid. A similar coating on the surface of the superphosphate particles reduced bag-set in incompletely cured mixed fertilizer prepared from the surfactant-treated superphosphate.

The acid-compatible nonionic type of surfactant promoted the rock-acid reaction, increased the bloat in the mixing pan and den and thereby produced a less dense superphosphate, and seemingly favored the retention of ammonia during its ammoniation in mixed fertilizer preparation. ◆

Acknowledgment

The authors are greatly indebted to the officials of the host company for their collaboration in conducting these tests and releasing the results for publication and to members of their technical staff for the manner in which they willingly assumed the extra burden of analytical work and other tasks involved in these tests.

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Table VII. Results of Bag-Storage Tests on Mixed Fertilizers

Bag Storage, weeks	Weight per cent lumps retained on 2-mesh screen from								
	Control mixture			Anionic surfactant			Nonionic surfactant		
	Bag 1	Bag 5	Bag 9	Bag 1	Bag 5	Bag 9	Bag 1	Bag 5	Bag 9
Bagged 2 Days After Mixing									
2	0.0	6.4	7.0	0.0	0.3	4.1	0.0	2.6	6.4
4	0.0	5.3	14.3	0.0	4.5	6.0	0.0	1.6	8.6
8	3.1	10.0	24.3	0.0	1.8	8.0	0.0	8.1	19.5
Bagged 3 Days After Mixing									
2	0.0	0.1	4.0	0.0	1.0	1.0	0.0	0.4	1.1
4	0.0	2.5	12.8	0.0	0.3	5.0	0.0	2.0	8.5
8	0.0	6.0	12.0	0.0	3.0	10.5	0.0	11.3	8.5
Bagged 8 Days After Mixing									
2	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3
4	0.0	0.3	2.5	0.0	1.3	2.3	0.0	2.0	1.8
8	0.0	1.3	2.8	0.0	1.3	2.8	0.0	11.3	5.0
Bagged 16 Days After Mixing									
2	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.1	0.2
4	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	2.0
8	0.0	0.0	2.0	0.0	0.0	0.5	0.0	0.0	1.3

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Garman, Halvorson, Baker Address Pacific NW Group

AN excellent turnout for the fifth annual Pacific Northwest Regional conference at Klamath Falls, Ore., July 20-22 heard a number of interesting addresses by industry and government speakers. The affair is sponsored each year by the Soil Improvement committee, Pacific Northwest Plant Food Association.

Dr. William H. Garman, American Plant Food Council agronomist, expressed his belief that, properly managed, our land resources can supply all basic agricultural needs for at least the next 100 years without any major difficulty. To accomplish this, Garman pointed out the necessity of steadily expanding research, extension and information programs.

Diseases of both animals and plants have caused extensive losses and, Garman stated, "I believe it would be safe to say that actual crop and livestock losses, due to diseases, were greater in the period 1950 to 1953 than in the same period 10 years ago."

In citing the increasing needs for research, he pointed out that the $250 million per year now spent on surplus storage is over three times the amount allocated to all agricultural research by the government during the past year.

Fertility Problems

Reporting on fertility problems of the Klamath basin, A. R. Halvorson, Klamath experiment station, stated that sulfur and nitrogen are needed on dryland areas, that nitrogen is needed on irrigated mineral soils and that phosphorus is also required under intensive cropping.

Although potash may soon be needed in the area, according to soil tests in some places, Halvorson said that this nutrient has given no conclusive evidence of producing yield increases.

Alkaline muck soils of the basin need phosphorus, copper, manganese and zinc, said Halvorson, and in some cases nitrogen. Acid mucks have been found quite deficient in phosphorus. When such soils extend into the summer pasture area of Fort Klamath, a complete fertilizer is essential for maximum production.

Following the reclamation of alkali or saline alkali soils in poorly drained areas, a nitrogen and phosphorus fertilizer is essential for good production.

The Idaho fertilizer testing program was discussed by G. Orien Baker, University of Idaho, who said that the main emphasis in northern Idaho is on nitrogen, but in the southern irrigated region, the three major elements are stressed.

Research Stressed

On the first day of the sessions, fertility research was stressed. Speakers included Karl Baur, Pacific Supply Coop., who presented an industry viewpoint on experiment station work. Baur suggested that field plot work be expanded and supplemented by prompt progress reports, and pointed out that greater efficiency can be obtained through staff and mechanical assistance for present technicians rather than through the addition of more specialists.

A paper by D. F. Allmindinger, Folke Johnson and V. L. Miller, western Washington experiment station, Puyallup, Wash., described the nearly complete control of dieback of pears obtained by a spray of one to two pounds of sodium pentaborate or three pounds of borax per 100 gallons of water applied as soon as harvest was completed.

Fertilizer Responses

Fertilizer responses were the principal subjects discussed July 21 and on the final day soil testing procedures and problems were considered.

Trips arranged for delegates included a tour of the Klamath Falls experiment station and sun-station and a visit to the Tulana farms and Williamson river ranch.

The 1955 sessions are to be held next year at Boise, Ida. ◆

'Do It Yourself' Plan

Adopted by Nitrogen Solution Distributors

Bob Dye, Vincennes, Ind., uses fertilizer rig for a top dressing application of no-pressure solution.

DURING the past few years, thousands of farmers have discovered the advantages of the new nitrogen fertilizer solutions and have adapted them in increasing amounts to their farming plans for topor side-dressings, or as plow-down applications on crop residues.

These materials proved popular because farmers saw in them a new tool of farming—a flexible, safe and easily-applied form of nitrogen. Equally important, they offered farmers a choice of combinations of proven forms of nitrogen in various combinations, furnishing a selection of concentrations of nitrogen ranging from 20 to 41 per cent.

The no-pressure solutions could be sprayed easily on top of the ground. And the low-pressure solutions needed only to be applied about two inches beneath the surface of the soil, thus effecting considerable savings in tractor power and fuel.

Opportunity for Savings

Many farmers and custom applicators saw the opportunity for savings with this more economical form of nitrogen and adapted the materials quickly. But for hundreds of other farmers, some problems remained unsolved. These fertilizers still needed application equipment which was not available on their farms. There are many farmers whose acreage is too limited to permit investment in specialized equipment —even though solutions rigs are cheaper than anhydrous rigs which need to withstand 211 pounds pressure per square inch as compared with pressure for solutions ranging from 0 pounds to 17 pounds per square inch. And countless thousands of other farmers found themselves in the familiar position of having a bulging equipment budget full of expenditure demands for tractors, implements and other mechanical necessities for modern farming.

For these farmers, the only answer was the sometimes disagreeable necessity for custom application if they were to use nitrogen solutions.

Some fertilizer distributors recognized this problem to be an inhibiting force in the merchandising of their materials. Their potential customers told them that they disliked seeing a custom applicator fertilizing their fields, doing a job they could well do themselves —"And do better," they said, "if only I had the equipment."

Senesac's Distribution Method

Until W. A. Senesac of Fowler, Ind., came along with his novel method of distributing fertilizers, his customers' problems with equipment remained unsolved.

Then, late last winter, Senesac attended a nitrogen solutions field day along with fertilizer dealers from a 15-state, midwestern area, sponsored by the Allied Chemical & Dye Corp.

At this meeting Senesac interested several other distributors in an idea he called the ' Do-It-Yourself" plan. By banding together for ideas and joint ordering of tanks and other materials needed for equipment manufacture, they could take advantage of savings and standardize their rigs and material needs.

Senesac helped design and build 25 two-wheel, trailer-type applicators which were rugged and sturdy enough for constant use yet light enough so that they could be pulled with one hand. The rigs were designed for use with either no-pressure solutions or with low-pressure carriers and could apply the fertilizers either as a spray or sub-surface applications.

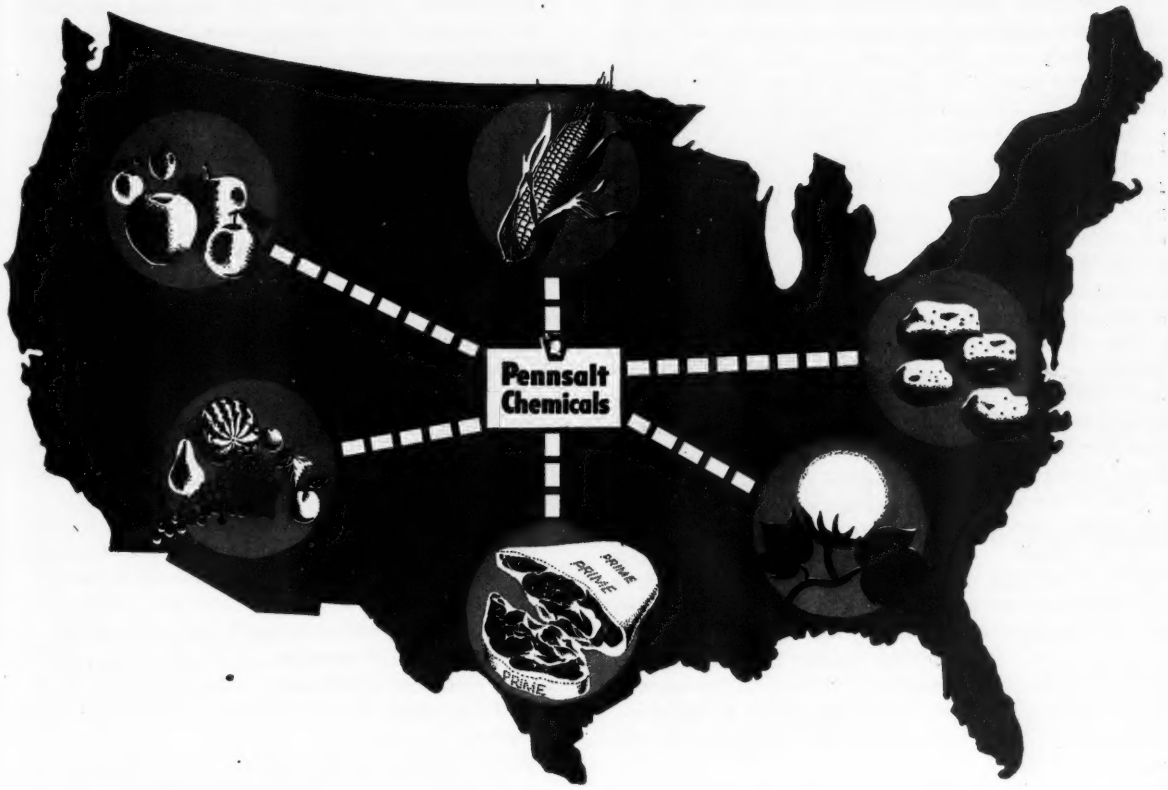
Merchandising

Once his equipment was ready, Senesac began merchandising his idea. He used handbills, newspapers and farm-to-farm personal contact work. He employed, on a commission basis, vacationing GI or Vo-Ag teachers for his personal contact work.

These men, with their specialized training in agriculture, had already been watching Senesac's progress and demonstration work with the new solutions and were familiar with the many advantages of this material.

Senesac gave each of his "ambassadors" a rig which he hooked on to his car like a trailer. And these men are traveling the area, talking, demonstrating and selling the use of the rigs and the fertilizer.

Before long, farmers in Benton and neighboring counties of Senesac's merchandising area were familiar



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with the plan. And their ready response to the Do-It-Yourself idea was soon apparent in the use-record of Senesac's rigs. Here's how the plan works:

A farmer goes to the Senesac Soil Service in Fowler and picks up an applicator rig loaded with up to 200 gallons of nitrogen solution; he tows it to his farm behind his truck, car, tractor or jeep. Should the farmer need more than 200 gallons, Senesac provides him with a "nurse" tank, containing up to 500 gallons of solutions. This tank is mechanically loaded on the farmer's truck, trailer or farm wagon. He hauls the equipment and the solutions to the farm and applies it himself on his own land.

For customers who prefer custom application, Senesac provides this additional service, using equipment which he has used for custom application for several years. Since starting his Do-It-Yourself plan, however, over 90 per cent of the farmers have preferred to do just that—do it themselves.

Use of the equipment is included in the 13 cents per pound nitrogen selling price.

When Senesac first announced his plan, sceptics said it would bog down immediately because farmers would borrow the equipment and "forget" to return it. This has not been his experience.

As he says, "The Benton county farm folks have given me excellent cooperation. They have returned the rigs promptly upon completion of the nitrogen application and have not abused the equipment in any way."

Farmers' Reaction

But what about the farmers' reaction?

In brief, they like it. And they are quick to tell you why.

First, they say, the rigs are built 100 inches wide and will go through gates and lanes. They are easy to hook up to the usual truck or tractor hitches and are rugged enough to be used on any type of soil or terrain in the area without danger of tipping or damage.

Another common reaction is the appreciation of the labor-savings with solutions.

"Just imagine," said Carl Gwin, Otterbein, Ind., when returning his rig, "I applied 38 tons of actual nitrogen with this applicator myself and the heaviest thing that I had to lift was the end of the hose when I filled the tank."

E. Wilkins, another Benton countian, remarked, "It's the easiest and cheapest way that I ever applied nitrogen to my fields."

Delbert Remole of Potomac, Ill., said he was very pleased with the ease with which the rigs could be pulled when putting nitrogen solutions down in sub-surface applications.

Many of Senesac's customers have reported that they could drive their Farmall H tractor in fourth gear with four knives in the soil applying solutions beneath the surface.

Willard Deno, a Fowler farmer, says, "These rigs and the plan is so simple that my 13-year-old son Jim has been able to apply these solutions to 80 acres of corn as a side-dressing without the slightest bit of trouble."

Barney Gick of Fowler said, "It's sure trouble free, and it's the easiest way to apply nitrogen to the soil."

Flexibility is Key Feature

Senesac had one eye on a key feature of nitrogen solutions when he designed his rigs. This feature is flexibility.

Some farmers, for example, have used the rigs for ditch bank or fence row spraying. Others have wanted to do a complete top-dressing in a rapid spray application. For these special uses, a 32-foot boom is attached to his rigs.

Many others have used one of the no-pressure solutions in combination with other chemicals. For this use, Benton county farmers have mixed no-pressure nitrogen solution with Aldrin, DDT or 2,4-D. These materials are compatible and do an excellent job together. The nitrogen gives the crop a boost and the chemical gives the pest a knock-out blow. This compatibility permits doing two jobs at one time with obvious labor savings and, of equal importance, it costs no more than a minute's labor to dump in the pesticide. To mix these same chemicals with dry fertilizers made of the same chemicals would cost from $25 to $30 per ton.

Solutions for Sub-surface Application

The solutions have also been used for sub-surface applications. Farmers have used the no-pressure or low-pressure solutions knifed into the soil about two

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inches in a pre-plant, side-dressing or pasture fertilizing program.

These Indiana farmers have noted many advantages of solutions for such usage. They say the solutions, with their low pressure do not need packing wheels behind the knives, and there is no ammonia "smoke" escapingor burning the leaves of corn plants. The vapor pressure of Arcadian nitrogen solutions is from 0 to 17 pounds, depending upon the type of solution and the temperature. This makes it especially easy for a farmer to make sub-surface applications without specialized care or training.

Senesac's rigs are safety tested to withstand at least 120 pounds of air pressure—four to five times the 15–18 pound working pressure which is used to squirt the solutions into the ground. This makes the equipment safe for use by farm help without specialized training or special safety precautions.

In good weather during this year's spring and early summer fertilizing time, every one of Senesac's rigs was in the field.

Low-Pressure Solutions

When the low-pressure solutions are used for subsurface application, they are forced into the soil from a tank by use of an air compressor. The rate of application is regulated easily and accurately by the size of the orifice or jet in the distributor manifold and the air pressure.

The equipment has been proven under all types of soil and growing conditions found in Benton county. It has worked well, no matter how dry or dusty the field or how hard the soils found in that area this spring.

There is no waiting list or schedule of names under usual conditions at the Senesac Soil Service office. When the demand increased, Senesac built more rigs. He says that service to the farmer is one of the most important products he has to sell.

Each rig is calculated to be used each year for 1,000 acres of crop land, including both spring and fall use.

Fall Business Increase

Each year, his fall fertilizer business has increased—not only for such usually fall-fertilized crops as small grains and pastures, but also for plow-down of crop residues with nitrogen to speed up decomposition, or for heavy fall applications to take the place of spring fertilizing with the resultant advantages of diversification of labor demands and assurance of good fertilizing weather during the fall.

In Senesac's area, farmers have learned through dozens of observations that no-pressure material plowed down with corn stubble in fall speeds up decomposition, increases soil bacterial action and helps balance the carbon-nitrogen ratio to the ideal 10 to 1 ratio.

In many cases, it has been the shortage of farm-owned equipment which has delayed acceptance of fall plow-down practices with no-pressure solution. Now that Benton county farmers can take advantage of the new equipment plan without equipment expenditures Senesac's fall business is expected to increase.

The ag teachers he employs have been a great advantage, he says. Their specialized training assures him that his customers will get the proper advice needed to help them in their fertilizing programs. For example, these men can talk and understand the importance of balanced fertilizing.

This is very important, he says, for while he is in the business of selling solutions containing only nitrogen, he realizes that "nitrogen is one of the best salesmen for phosphorus and potassium."

His men explain to the farmers that they cannot harvest top returns from their nitrogen fertilizer investment unless their soils are properly fertilized with other plant requirements.

Widespread Inquiries

The Do-It-Yourself plan is becoming known all over the area and inquiries are coming in from widespread sections ranging from Pennsylvania to Colorado, wherever nitrogen solutions are being used.

Other distributors are taking up the idea and supplying farming areas in their states. Some have used modifications of the equipment, one example of which can be found in Welcome, Minn. There A. J. Schuler is using a gravity flow, deep placement, two-wheel trailer type of applicator.

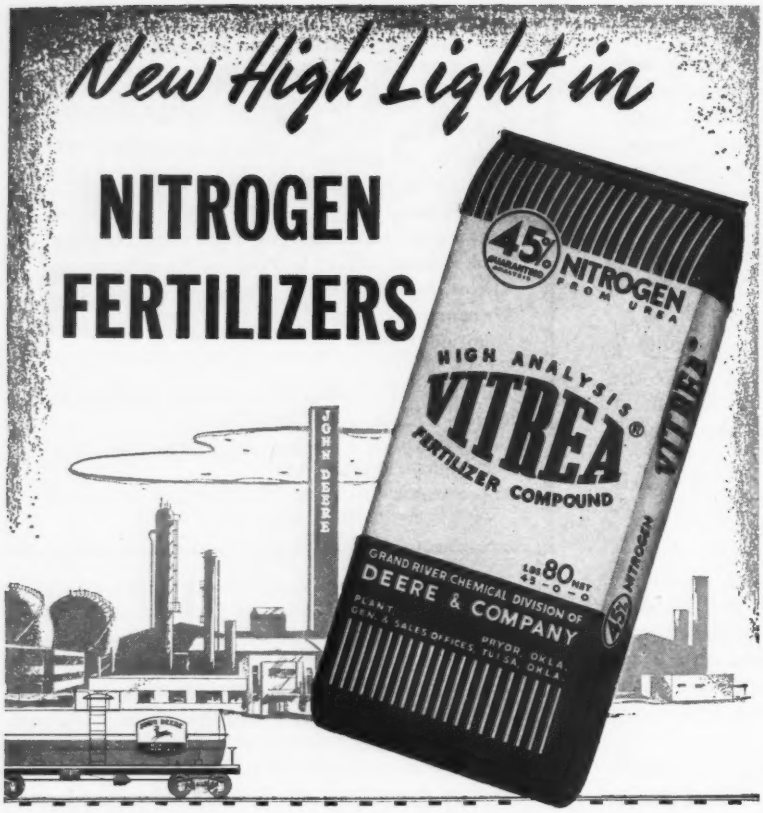
And here and there, in Senesac's area, individual farmers are finding it convenient to buy one of the solutions rigs now on the market or build one of their own. This trend will increase over the years as the farmers use more and more of the nitrogen solutions.

But in the meantime, there will always be some need for an equipment loan type of service or custom application such as Senesac offers. He is helping bridge the gap between introduction and widespread application of a new group of fertilizer materials.

As Senesac says, "It is true that I have had to make a big investment in applicators, fittings, storage tanks and equipment, but I have faith in Benton county farm folks and I realize that they must prosper if I am to stay in business. The honeymoon days of the custom applicator are about over. Today, it is service that counts. And if I can perform this service while helping my customers make money with Arcadian solutions, then I can stay in business right here in Benton county which is just where I want to be." ◆

Specifications for Senesac's Applicator Rigs

Axle is of double tubing design 2½inch diameter.
Width of rig, 100 inches.
Capacity, 202 gallons.
Tank construction, aluminum, 3/16 thick.
Hose ⅜ inch.
Hose engager couplings, ever-tight quick coupling.
Tanks manufactured by Progress Manufacturing.
Knives, hydraulic input, spring retracting.
Air compressor, Speedy, by W. R. Brown.
Manifold, 6 holes.
Tires 6.70 x 15.
Knives, ⅝ x 2½, spring steel with Dempster point.
Service tank capacity, 500 gallons.
Safety and service features: shut off by Hills; pressure gage; rupture disc.
Approximate cost $650. This cost can be reduced with larger quantities.



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Pasture Production

Using the right fertilizer will result in better production from high-yielding grass-legume pasture and forage mixtures according to USDA agronomists. More frequent limited applications are also suggested as a possible improvement in current practices.

Studies on typical eastern soils show, for example, that fertilizers high in potash, applied in the same amounts, do a better job than the commonly used superphosphate plant foods.

Middle Atlantic and New England soils are low in native potash, yet tests have shown that mixtures such as bromegrass-alfalfa or orchardgrass-Ladino clover will remove annually from 100 to 150 pounds of potash per acre compared to only 20 to 40 pounds of phosphate.

Agronomists have found that on eastern soils, these mixtures respond well to fertilizers with a 0–10–20 ratio.

Plant tendency to absorb more potash than needed when it is abundant indicates that several smaller applications during the year may be more efficient than the usual single large application. This would also help minimize the tendency of potash to leach away.

According to the agronomists, further research is needed to determine whether benefits of increased production justify the additional applications.

Cattle Pests

Cooperative research between Oklahoma Experiment Station and USDA has shown that beef cattle sprayed monthly during the horn fly season with a 0.5 per cent DDT solution will gain about 18 pounds more per animal than those not sprayed, USDA reported.

More recently, the Oklahoma station has demonstrated that "rubbing posts" treated with insecticide solutions are not only just as effective as monthly sprayings, but the cost of insecticides is cut in half and there is practically no labor charge. The type of post used made little difference but location was found to be all important. Best results came from placing posts where cattle spend most of their time.

Pest Reports

European Corn Borer Attracts Major Attention

The insect attracting major attention during August in some of the principal corn growing states was the European corn borer. At the first of the month Iowa reported egg counts for second generation varying from 0–150 per 100 plants with first-brood infestation of plants running from 70–90 per cent. According to entomologists in that state all evidence indicates the most severe infestations since 1949.

In Illinois indications also pointed to heavy second-brood moth flights and heavy egg-laying over the area north of Bloomington, even though the first-generation was spotted in some areas.

First-generation infestation in Minnesota was running up to 65 per cent (southwest district) and if borer development escaped significant retardation by weather, appreciable second-generation damage was expected. Early in the month it appeared that corn to be harvested after about August 25 would require treatment in Minnesota.

Wisconsin was also anticipating a heavy build-up along the Minnesota, Illinois and Iowa borders, and South Dakota had a very heavy first-brood infestation with heavy damage expected from the borer this year.

Grasshoppers & Armyworms

Severe grasshopper damage to crops continued in several states, especially Kansas and Missouri. Heavy damage to field crops continued over Missouri and in the eastern area of Kansas where only the stalks remained in many corn fields.

The situation in Missouri was aggravated by drought conditions. The build-up continued over most of Wisconsin and crop damage was becoming more serious by the middle of the month with control activities not keeping pace with the infestations.

South Dakota was also having alarming increases especially in the central and western counties, while infestations in Illinois were heavier than in the past few years and Indiana treated thousands of acres for control of the 'hoppers.

Other states reporting trouble from grasshoppers in crops included Arkansas, Oklahoma, New Mexico and Nebraska.

The armyworm problem had spread from Maine to Montana to New Mexico by early August with some states reporting widespread outbreaks.

Based on material received from Economic Insect Survey Station, Plant Pest Control Branch, Agricultural Research Service, USDA, supplemented with information received by FARM CHEMICALS *from Federal and state agencies.*

Vermont had heavy damage generally in the Champlain Valley with heavy populations over the entire state, Massachusetts reported damage over large acreages in the eastern area and Rhode Island and New York experienced extensive infestations in corn, oats and hay.

The heavy infestations in South Dakota and Minnesota were subsiding by August 1. Early estimates revealed that between one-half and three-fourths million acres were treated in the latter state against the armyworm during the latter part of July.

Wyoming and Montana had heavy local infestations in several counties on oats and other crops while New Mexico and Colorado reported severe damage over wide areas.

Fruit Insects

The most important pest activity in orchards concerned mites and the codling moth. Mite populations were high and causing damage in some orchards in Massachusetts, New York, Kentucky and Indiana.

Contrary to early expectations the codling moth infestation in Indiana was generally high and considerable damage has resulted. Injury is higher in the northern area than for several years.

Second-brood injury was also greater than normal in some apple orchards in New Jersey but appeared very light in northeastern Ohio and generally light in Kearneysville area of West Virginia.

Cotton Insect Conditions

In general the cotton insect picture was considerably more encouraging during first half of August than it was during the same period in 1953. The boll weevil infestations were lower on the whole with such states as Mississippi, Tennessee and Arkansas reporting very low infestations for the week ending August 6. It appeared at that time that infestations in Oklahoma were the lightest since 1936.

On the other hand, by the middle of the month injurious infestations of bollworms were occurring in many areas where cotton remained succulent. Mississippi, Louisiana, Texas and Arizona were showing increases and the bollworms were reported to be the major problem of most cotton farmers in Arkansas.

Cotton leafworm specimens were also being taken at this time in Louisiana, Arkansas, Oklahoma and New Mexico, but the spread of this defoliator had not been as great as in 1953 and very little economic damage had been recorded.

A report of gin trash inspections for the pink bollworm in the lower Rio Grande Valley of Texas stated that the infestation was low compared with the average of recent years, and up to the first week of August there had been no report of commercial damage in the lower valley counties.

A brown cotton leafworm (*Acontia dacia*) has been found causing considerable damage to cotton in south central, eastern and upper coastal areas of Texas. The insect caused considerable ragging of cotton in these areas, and over 5,000 acres were treated. Although this insect was collected on cotton in 1953 in Texas, this year's infestations are the first to cause economic damage as far as can be determined.

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Research Briefs

Important New Records

A single adult Mexican fruit fly was trapped August 9, 1954, in a grapefruit tree in the City of San Ysidro, San Diego county, Calif. This collection, the first in California, was made about one mile north of the international border.

Mexican fruit flies have been found for the past several months south of the border in Baja, Calif.; therefore, the discovery was not unexpected and county, state and Federal agricultural authorities moved rapidly to make effective previously planned programs for the control of the fly.

Mexican fruit fly is the main citrus-infesting fruit fly of Mexico. It destroys large quantities of fruit in Mexico and Texas where in migrates annually. The fly is not a tropical insect, and therefore can build up a population and infest fruit under varied temperature conditions. The San Ysidro specimen was collected in a planting of 17 trees, including peach and orange trees. White sapotes and citrus fruits, except lemons, are preferred hosts; however, it freely attacks several other fruits including apples, peaches and pears.

The European chafer, a destructive pest of turf, was collected in West Virginia for the first time in June 1954. Adults were taken in traps and in flight in Hampshire county near Capon Bridge. The insect, which is known elsewhere in the United States only in western New York and at Meriden, Conn., was apparently introduced into the West Virginia area through a shipment of balled nursery stock. Additional infestations were also recently discovered in the western New York area at Buffalo, Niagara Falls, Elmira, Syracuse and Liverpool.

Shelled Corn Protection

Albert C. Apt, USDA researcher, reports in a recent bulletin the results of application of various spray and dust formulations to 3,000 bushel bins of shelled corn in experiments carried out in the fall of 1952.

The formulations, containing synergized pyrethrins, ryania or lindane, were applied as the corn was transferred from one bin to another, and monthly samples were taken from each bin through December, 1953, to determine insect populations.

No insects were found after treatment with pyrethrins-piperonyl butoxide-talc dust at 100 pounds or with ryania-*n*-propyl isome dust at 60 pounds per 1,000 bushels. The first formulation caused downgrading of the corn because of the inorganic base.

Insect populations were held to a very low level by ryania, ryania-sulfoxide and ryania-*n*-propyl isome dusts at 45 pounds or lindane-flour dusts at 60 pounds per 1,000 bushels. The ryania-sulfoxide mixture, however, caused downgrading of corn due to an objectionable odor.

Dusts of pyrethrins-sulfoxide-ground rice hulls and pyrethrins-piperonyl butoxide-corn cob flour at 100 pounds per 1,000 bushels and a spray of pyrethrins-piperonyl butoxide-water at 10 gallons held insect populations to a relatively low level.

It was found that a spray containing pyrethrins-piperonyl butoxide-carbon tetrachloride and dusts of lindane and flour at 45 pounds or pyrethrins-piperonyl butoxide-corn cob flour at 65 pounds per 1,000 bushels failed to stop the development of dangerous insect populations.

Ryania residues were found to remain high after seven months but were rather variable. Lindane residues, after three months, were only one-thirtieth to one-fortieth of the amounts applied.

Evaluation of Dusts and Sprays for the Protection of Shelled Corn from Insect Attack, by Albert C. Apt. USDA Agricultural Research Service, Entomology Research Branch, publication E-875, April, 1954.

Rice Sprays

According to Progress Report 1678 from the Texas Agricultural Experiment Station, MCP amine appears to be the herbicide least apt to cause injury to rice of those involved in recent tests.

Tests with Century Patna 231 variety gave yields which were not significantly affected by one-half pound acid equivalent rates of applications of 2, 4-D, 2, 4, 5-T or MCP amine when used on 30-day rice. Yields, however, were definitely depressed when applications were made after the rice started to head.

At the end of 63 days no evidence was found of MCP, 2, 4-D or 2, 4, 5-T being present in the soil or sprayed plots. Germination and milling quality were not affected by materials and rates

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tested at the different dates of application.

Bluebonnet 50 rice yields were not adversely affected by three-fourths pound acid equivalent rates of the amine salts of 2, 4-D, 2, 4, 5-T or MCP applied up to the first few days after the rice went into boot.

Although tests have shown that legumes are often injured by 2,4-D, work in Mississippi during the past three years shows that two-thirds of a pound per acre of the amine salt formulation of this compound can be used to advantage on permanent pasture, according to a USDA report.

When applied at this rate, most of the weeds were killed and a better stand of grasses resulted with no apparent damage to the white clover and lespedeza. Other work has confirmed these results, the report stated, and researchers now feel sure that 2,4-D can be used to control weeds in permanent pastures provided it is used on established grass and legume stands and that the rate of application does not exceed two-thirds of a pound of 2,4-D per acre.

Fire Ant Control

Aldrin, dieldrin and chlordane supply the best answer to the problem of controlling the imported fire ant, according to entomologists of the USDA. (It is called "imported" to distinguish it from fire ants native to this country. "Fire" refers to its sting.)

This pest, now prevalent in the Southeast, which has a taste for both plants and animals, can be detroyed by spraying its mounds with these insecticides or, in the case of widespread infestations, by applying one of the chemicals to the entire soil surface of the infested area.

Complete control information is available in a new USDA Leaflet 350, "The Imported Fire Ant—How to Control It," single copies of which are available free of charge from the Office of Information, USDA, Washington 25, D. C.

CALENDAR

Sept. 6—National Joint Comm. on Fert. Application and Amer. Society for Hort. Science, Univ. of Fla., Gainesville.
Sept. 8-10—NAC meeting, Spring Lake, N. J.
Sept. 13—S. C. Plant Food Educ. Society annual meeting, Clemson House, Clemson, S. C.
Sept. 15-17—Div. of Fertilizer & Soil Chemistry, ACS, Statler Hotel, New York City.
Oct. 6-7—Fifth annual conv., Pacif. N.W. Plant Food Assn., Sun Valley, Ida.
Oct. 15—Assn. of Amer. Fert. Cont. Officials, Shoreham Hotel, Washington, D. C.
Oct. 16—Assn. of Econ. Poisons Cont. Officials, Washington, D. C.
Oct. 18-19—Fertilizer Section, National Safety Congress, Chicago, Ill.
Oct. 25-29—American Soc. of Agronomy meeting, Minneapolis, Minn.
Nov. 3-4—Annual S. C. meeting for fert. dealers, salesmen and mfrs., Clemson, S. C.
Nov. 8-12—Amer. Society of Agronomy, St. Paul, Minn.
Nov. 10-12—NFA Southern convention, Hollywood Beach hotel, Hollywood, Fla.
Nov. 15-16—Calif. Fert. Assn., Coronado, Calif.
Nov. 15-16—Eastern Branch, ESA, New York City.
Nov. 18-19—Fertilizer section, S. C. Annual Accident Prevention conf., Spartanburg, S. C.
Nov. 29-30—Indiana Fertilizer conf., Purdue University, Lafayette, Ind.
Dec. 2-3—Beltwide Cotton Insect Control conf., Adolphus Hotel, Dallas, Tex.
Dec. 5-9—Agric'l Ammonia Inst., Jung Hotel, New Orleans.
Dec. 6-9—North Central Weed conf., Gardner Hotel, Fargo, N. D.

BHC and Lindane Dips

BHC and lindane are now acceptable under USDA regulations for dipping cattle and sheep in Federal-state cooperative scabies eradication programs. This approval is extended only to wettable powders and not to emulsifiable concentrates.

Previously, only dips containing nicotine sulfate or lime sulfur were approved for this purpose. USDA officials stated that experience has proved the BHC and lindane dips, if used properly, provide effective scabies control, but warned that care must be exercised to avoid loss of animals by dipping.

Literature

Proceedings, British Weed Control Conference, 1953. Available from W. A. Williams, Association of British Insecticide Manufacturers, Cecil Chambers, 86 Strand, London, W. C. 2. 484 pages. 30/–. Money orders and checks should be made payable to the conference.

A full report of the 12 formal papers, 33 research reports and a list of members are included in the proceedings of the First British Weed Control conference held Nov. 3–5, 1953. The meeting was held under the auspices of the Ministry of Agriculture, the Agricultural Research Council, The Association of British Insecticide Manufacturers, the British Agricultural Contractors' Association and the National Farmers Union.

Weed problems in forestry, grassland, fruit and vegetable crops; the

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cost of weeds: weed seeds and spraying problems were covered in formal papers.

Proceedings, 1954 Southern Industrial Wastes Conference. 210 pages. Manufacturing Chemists' Association, 1625 Eye St., N. W., Washington 6. $2.50

Delegates to the conference heard 22 papers discussing all phases of air and water pollution abatement techniques, Mathieson's S. Cottrell reported on the control of air pollution at a fertilizer plant.

A Balanced Diet for Plants. 8 page pamphlet. California Fertilizer Association, 475 Huntington Dr., San Marino 9, Calif.

Aimed at promoting greater use of mixed fertilizers, the pamphlet has been distributed to farmers, nurserymen and home gardeners throughout California. Included is a four color plant food utilization chart showing the NPK appetites of twenty crops.

How to Spray the Aircraft Way. Farmers' Bulletin 2062. Office of Information, USDA, Washington 25. A single free copy can be obtained.

Designed to tell farmer and pilot what they need to know to get best results in killing crop-destroying pests by aerial spraying, the bulletin includes data on aircraft performance, formulation, acreage calculation, safety and legal pointers, etc. It was prepared by the ARS Aircraft and Special Equipment Center which is now being moved to USDA's Beltsville, Md., operation.

Review of Literature on Health Hazards of Fluorine and its Compounds in the Mining and Allied Industries. I. C. 7687 by S. J. Davenport and G. G. Morgis. Bureau of Mines Distribution section, 4800 Forbes St., Pittsburgh 13, Pa. Copy sent without charge.

Toxic effects of fluorides on vegetation, animals and human beings are discussed in the report which summarizes published material dating from 1887.

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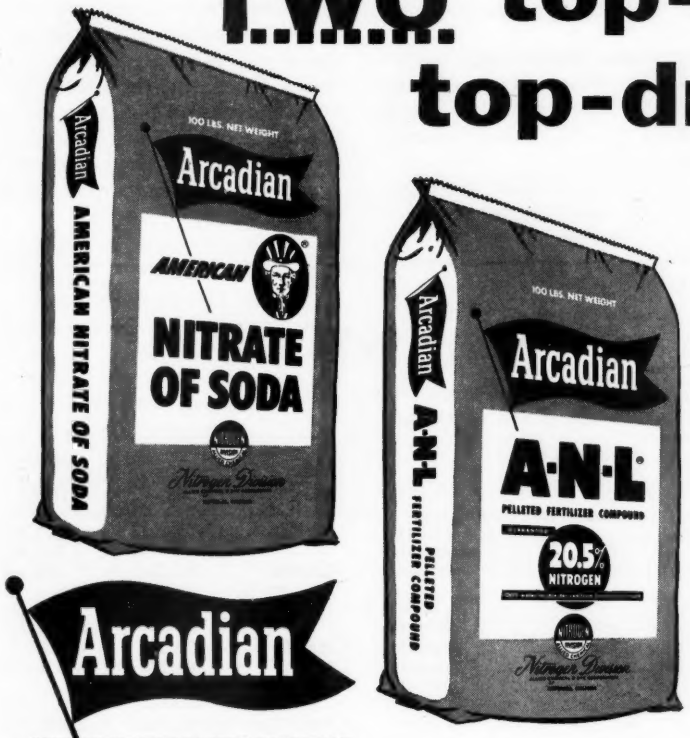

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Described are over 90 safety devices that have been found effective in plant use, originally part of a safety gadget show presented during the 1953 safety congress. Each is illustrated with a large photograph showing clearly the details of construction.

Two recent NSC booklets are "What's in It for Me?" and "Two-Wheel Hand Trucks." The first is a 16 page affair designed to encourage the worker to aid in the fight against accidents. The latter is a recent addition to the council's safetygraph series and outlines proper maintenance and use of two-wheel handtrucks. Write NSC for information on prices.

Corporate Structure of the Corporation: Its Meaning—Its Evolution. 109 page monograph. American Institute of Management, 125 E. 38th St., New York City 16. $12.00.

The answers to twenty-eight questions posed in the book will "readily demonstrate to the self-analyzing management where its own structural weaknesses lie." Chapters on the meaning of corporate structure, authority and responsibility, non-management factors, committees, organization and operation and communications are included.

Techniques of Plant Maintenance & Engineering—1954. Cloth bound, 291 pages, 8½ x 11, 55 illus. Clapp & Poliak, Inc., 341 Madison Ave., New York City 17. $7.50 (sent without charge to those attending current Plant Maintenance & Engineering conference).

Contains texts of papers by 24 authors and direct answers to over 1,300 questions. A new feature is the summary of 20 round-table discussions, one of which was devoted to chemical plants.

This year's principal sessions concerned "Planning and Scheduling Maintenance Work" and "Maintenance Cost Control and Budgeting."

Know Your Patenting Procedures (No. 49) and **How Manufacturers' Agents Help Small Business** (No. 50). Small Business Administration.

Two free leaflets have been prepared, the first designed to familiarize businessmen with patent information, and the second to show how agents can provide effective and economical marketing for many small business concerns.

Andrews Revises Book

W. B. Andrews has announced that the second edition of his book, "The Response of Crops and Soils to Fertilizers and Manures," is now available.

He has completely rewritten the chapter on anhydrous ammonia and now includes information on other sources of liquid nitrogen.

Super Production Drops

Superphosphate production in May totaled 182,637 short tons (100 per cent APA), a drop of 16 per cent from April and 9 per cent under the corresponding 1953 period.

Shipments of all grades amounted to 96,750 tons, a decrease of 38 per cent from the previous month and a 5 per cent drop from May, 1953. Stocks on hands at the end of the month were 7 per cent greater than on May 1 and were 4 per cent greater than at the end of May, 1953.

Production - May, 1954

Compiled from government sources

Chemical	Unit	May 1954	May 1953	April 1954
Ammonia, synth. anhydrous	s. tons	249,837	192,424	232,246
Ammonia liquor, coal & coke (NH_3 content)	pounds	———	———	3,503,535
Ammonium nitrate, fert. grade (100% NH_4NO_3)	s. tons	129,904	95,536	125,457
Ammonium sulfate				
synthetic (technical)	s. tons	[1]75,910	38,504	*78,233
coke oven by-product	pounds	———	———	130,921,736
BHC (Hexachlorocyclohexane)	pounds	9,265,656	5,578,219	7,236,610
Gamma content	pounds	1,459,527	865,270	1,121,398
Calcium arsenate (commercial)	pounds	———	216	———
Copper sulfate (gross)	s. tons	6,116	———	6,852
DDT	pounds	9,574,147	10,139,702	8,750,416
2,4-D acid	pounds	3,087,898	2,961,527	2,863,249
esters & salts	pounds	2,243,165	2,304,040	*2,134,181
esters & salts (acid equiv.)	pounds	1,749,045	1,801,984	*1,648,712
Lead arsenate (acid & basic)	s. tons	1,055	964	1,539
Phosphoric acid (50% H_3PO_4)	s. tons	263,420	218,427	*264,979
Sulfur, native (Frasch)	l. tons	465,360	455,380	445,158
Recovered	l. tons	31,000	28,301	31,000
Sulfuric acid, gross (100% H_2SO_4)	s. tons	[1]1,178,975	1,257,882	1,193,680
Chamber process (100% H_2SO_4)	s. tons	215,472	264,695	228,234
Contact process (100% H_2SO_4)	s. tons	[1]963,503	993,187	965,446
Superphosphate (100% APA)	s. tons	182,637	201,072	*234,424
Normal & Enriched (100% APA)	s. tons	139,760	158,491	*176,915
Concentrated (100% APA)	s. tons	42,509	42,042	*38,794
Wet base (100% APA)	s. tons	368	539	*909
2,4,5-T Acid	pounds	———	490,712	———

* Revised

[1] Includes quantities for two plants not previously reporting.

FERTILIZER MATERIALS MARKET

New York

August 12, 1954

Sulfate of Ammonia. This material was said to be moving rather slowly although there were severall arge Government inquiries in the market for export to the Far East. No price changes were noted.

Urea. Production of domestic material is increasing. Imported material is available at about $118 per ton at various ports with frequent arrivals. Demand is only fair at the present time.

Nitrogenous Tankage. This material is in a strong position, with some producers sold out for the balance of the year and practically no imported material being offered. One domestic producer has advanced his price 50 cents per unit to $3.50 per unit of ammonia ($4.25 per unit N), f. o. b. shipping point.

Castor Pomace. No offerings are reported of this material with last sales made at $27 per ton, f. o.b. production points. Producers are sold out through September and not offering beyond. The production is still limited because of the heavy imports of castor oil.

Sludge. Material being offered for shipment over the next few months at the same price as last year and sales are being made on basis of $2.75 per unit of ammonia ($3.34 per unit N), plus 50 cents for phosphoric acid, f. o. b. shipping points.

Organics. Some trading was noted in organic fertilizer materials although both the feed and fertilizer trade were buying limited amounts of high priced materials such as soybean meal. Last sales of this material were made at $88 per ton in bulk, f. o. b. Decatur, Ill. Cottonseed meal was quiet as well as linseed meal. Tankage last sold at $7.75 per unit of ammonia ($9.42 per unit N), f. o. b. Eastern shipping points, with blood at the same price.

Fish Meal. Unground dried menhaden fish scrap was quoted at about $122 per ton, f.o.b. fish factories, with fish meal selling about $5.00 per ton higher. While the catch on the eastern coast was reported as good, fishing was slow in the Gulf. Some imported material was available from time to time at about the same price as domestic material.

Bone Meal. At the present time this material is rather scarce with no offerings of raw bone meal reported. Steamed bone meal continues to be sold at about $60 per ton, f.o.b. shipping points, and demand is excellent from both fertilizer and feed trade.

Hoof Meal. Market quiet with last sales on the basis of $6.75 per unit ($8.20 per unit N), f.o.b. Chicago.

Superphosphate. Stocks are said to be increasing in the hands of producers because of the slow shipping movement, particularly at this time of year. While no price changes were reported, the market was rather easy. Demand for triple continues good and producers are said to be in a good position to make immediate shipment.

Potash. With practically no imported material arriving recently the market was largely in the hands of the domestic producers but supplies at the present time are more than adequate to fill buyers' needs. However, sulfate of potash is still in limited supply and demand is said to be good.

Philadelphia

August 12, 1954

The materials market remains quiet with the general movement somewhat behind last year. There is no scarcity of any of the principal raw materials, though stocks on hand are not really excessive. Buyers show no tendency at this time to purchase ahead. As we are in the off-season, much activity is not expected.

Sulfate of Ammonia. Market is quiet with very little demand, and the production of coke-oven grade has been cut. However, the supply of synthetic has been increased and is now able to meet the demand.

Nitrate of Ammonia. Production is well ahead of last year and the supply position has accordingly been much improved. Demand is not very active at present.

Nitrate of Soda. No change in prices is reported and market is seasonally quiet. Supplies are ample to meet current demand.

Blood, Tankage, Bone. These packing-house by-products are in easier position, with demand quiet and no pressure to sell. Blood is quoted at $7.75 per unit of ammonia ($9.42 per unit N), both here in the East and in Chicago area, with tankage $7.75 ($9.42 per unit N), here and $8.25 ($10.02 per unit N), in the West. Bone meal remains quiet at $60 per ton, and hoof meal has sold at $6.75 per unit ($8.20 per unit N), Chicago.

Castor Pomace, This is reported all sold for August and September.

Fish Scrap. This is very quiet at $130 per ton for menhaden meal, and $125 for scrap. Imports of fish meal are quite ahead of last year.

Phosphate Rock. This is seasonally quiet and the supply position is improving. Stocks are ample for domestic trade.

Superphosphate. There is practically no activity and contract deliveries are moving at only a moderate pace. Production of the triple grade has increased, and because the demand has slowed down there is no scarcity now.

Potash. Contract sales during the past month are said to have been satisfactory, but withdrawals have been very slow. However, this situation is said to be improving.

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TEAMWORK

Stressed by Palm

AS LONG as there is teamwork between the entomologist, the farmer and industry, therein lies our ability to control effectively our insect enemies; to be prepared to feed 190 million people in 1975 as compared to our present 151 million and to produce perfect vegetables and fruits.

This belief was expressed by Dr. Charles E. Palm, head of the Department of Entomology of Cornell University's College of Agriculture, when he addressed two groups, one at Niagara Chemical div., Food Machinery and Chemical corp.'s Middleport, N. Y., research library and the other at the Rotary Club in Medina, N. Y., according to information received from J. V. Vernon, Niagara Chemical div. president.

Dr. Palm outlined the growth and development of the entomology profession, discussing the many methods for insect control which have evolved during the past century, and said the most important has been through the use of chemicals. With the discovery of the insecticidal properties of DDT in 1942, we began an era which might be called the most significent decade of insect control during the past 100 years of professional entomology. In spite of the importance of new insecticides, Dr. Palm stressed quite emphatically the role of the beneficial insects, which can be maintained if the new synthetic pesticides are used intelligently.

The synthetic chemicals have made possible a high degree of perfection in pest control, stated Palm, resulting in remarkable increases in meat and milk production, in fruits, vegetables and potatoes and in grain production. We have better and more food now from essentially the same acreage used in the 1920's. We also enjoy better health through the control of insects which carry the malaria, typhus and dysentery organisms.

The problem of resistance to chemicals is not new, but is the most challenging problem of our time, he stated. Unless science can solve the problem satisfactorily, we shall be shifting our pesticide practices rather constantly from one chemical to another in the field of pest control.

Nevertheless, Dr. Palm looks optimistically to the future because he feels that the cooperative and combined efforts of the entomologist, the farmer and industry will cope with and solve present and future problems even better than in the past.

The teamwork of these three groups, he feels, will eventually play a vital role in raising the habits and living standards of the people in underprivileged areas, and in turn will contribute to relieving world tension. ◆

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editorial

Poisoning Costs; Industry Reports

HOW MANY farmers do you think know the real value, or cost, of a good boll weevil program? Many have probably weighed the costs to some degree but few seem aware of the actual net cost or of the values derived.

Last spring, at the Darlington county, S. C., Cotton Production meeting, Robert R. Coker, president, Coker's Pedigreed Seed Co. gave a short talk in which he attempted to set down the actual costs of an efficient weevil control program.

Using figures developed from cotton mechanization experiments conducted on his company's seed farms, Coker figures that $2.00 an acre is a good approximation of spraying or dusting costs. To obtain a fair cotton evaluation he adopted such figures as 90 per cent of parity, support price of $.30 or better, $50.00 per ton basis grade for seed, 500 pounds of lint and 1,000 lbs. seed per bale of seed value and came up with a figure of 11.7 cents as the value of a pound of seed cotton.

Using the $2.00 per poisoning figure and an average of 75 bolls per pound of cotton, he eventually found that it takes only 1/10th of a boll, ½ lock, to the hill to pay for one poisoning. Thus he suggests as a slogan, "One Boll to the Hill Will Pay Your Poisoning Bill." This may not have quite the punch desired in a promotional banner but the idea is one that should be sold, not only for cotton production.

A RECENT case study on productivity and factory performance and accompanying comments on working conditions will be of interest to fertilizer manufacturers. Although prepared for European consumption by the U. S. Department of Labor through the Foreign Operations Administration, it does include some comments on the fertilizer industry as a whole.

It is in no way a statistical survey but is merely a report covering the activities of five U.S. plants, four of which produce superphosphate. Special attention is paid to the working conditions and earnings of production workers.

A "tremendous gain" in purchasing power for fertilizer industry workers is noted for the period 1939–1951 when average weekly earnings rose from $14.71 to $52.33.

Although not as high as the average for all manufacturing, earnings have increased at a faster rate during recent years, partially attributed to a 17 per cent increase in average hours worked since 1939. Average hourly earnings tripled during the period. In December, 1952 the average weekly wage was reported at $57.41 and average hourly earnings at $1.354.

In reviewing the union situation, the FOA report states that about 50 per cent of the industry's plants are organized with the largest membership in the UMW.

UNION contracts usually include clauses covering time-and-a-half for work over eight hours a day and 40 hours weekly: double time for holiday or Sunday work and six paid holidays in many plants. Other provisions may include requirements that gloves, goggles, oil skins, rubber boots, respirators, gas masks, first-aid facilities, clean lockers, showers and restrooms be provided by the companies.

More than 75 per cent of the workers are employed in plants offering one week of vacation after one year of service. About two thirds are in plants providing two weeks vacation after five years service.

More than 40 per cent are covered by company provided life insurance plans. Less than 15 per cent work on second or third shifts, and half of these receive a wage differential, usually five to 10 cents an hour.

Safety is also considered in the report which indicates that the best results in safety programs are obtained when both supervisors and workers are included on the plant committee. The plant studies showed that protective equipment such as goggles, respirators, gloves or safety shoes are provided for workers in hazardous operations with goggles and respirators worn in sulfuric acid and dry-mix plants.

Reviewing the effects of technological change, authors point out that methods and ideas developed in negotiations over technological change are used in many industries besides the one in which a problem first appeared. Technical details concerning machines, processes and conditions of employment still require agreement on a cause basis within the framework of ideas and methods handed down from past experience.

Materials handling in the five case plants is also emphasized and this will probably be of special interest to the European production men for whom the book has been printed. It reflects the trend towards automatic operation of plant facilities through addition of systems of conveyors, elevators and mobile materials handling equipment.

—GEO. P. TEEL, JR.
Managing Editor

260—Crag Repellent

Addition of Crag Fly Repellent from Carbide & Carbon Chem. co. can improve your insecticides while lowering costs. The material repels stable, horn, house and horse flies, protecting livestock even during hot summer months. It is very compatible, odorless, synergizes pyrethrins and allethrin and is safe for dairy animals. For technical information

CIRCLE 260 ON SERVICE CARD

261—Preform Crease

The crease in the Bagpak Preform multiwalls makes bag top forming easier, speeds bag closing, insures better filling and produces a better looking package without waste. Easier opening permits faster, more complete filling, and bags are filled, formed and closed in record time. Complete information and prices are available.

CIRCLE 261 ON SERVICE CARD

262—Agrea Folder

A new folder from Grace Chemical points out the six important advantages of Grace Agrea, its agricultural urea product soon to be placed on the market. Considering only agricultural applications, it opens into a large chart showing methods of use along with typical state per acre fertilizer recommendations for major crops. For a copy

CIRCLE 262 ON SERVICE CARD

263—Dr. Wolf's Labs

Laboratories of Dr. Benjamin Wolf, located in Bridgeton, N. J., and Hollywood, Fla., offer varied services for fertilizer and pesticide manufacturers. Duties performed include the testing of pesticides, aid in formulating all farm chemicals, rapid soil tests and work on uncovering new uses for old chemicals or waste material. For a booklet describing this organization

CIRCLE 263 ON SERVICE CARD

264—Pneumatic Conveying

Young Machinery co. now offers a Transvair pneumatic conveying system for which numerous cost advantages over mechanical systems are claimed. A complete pilot plant system for testing customer products is available. To obtain a booklet describing an installation handling a 50 mesh material without dust losses or need for filter type collectors or wet scrubbers

CIRCLE 264 ON SERVICE CARD

265—New Link-Belt Book

A new 340-page standard products catalog from Link-Belt provides information on chains and sprockets, transmission products, conveyor components and engineered products such as vibrating screens, car spotters and power unloading scoops. The volume has a flexible cover and thumb index with capacity charts and dimension tables to aid in rapid selection of standard products and stock items. Manufacturers interested in a copy can

CIRCLE 265 ON SERVICE CARD

FREE INFORMATION to help you solve fertilizer, pesticide problems

Reader Service

266—Cure Accelerator

Peak fertilizer shipping capacity can be increased when Nacconol, the low cost cure accelerator, is used. National Analine has both flake or bead forms for addition at weighing hopper or pre-mix with other dry materials. Other advantages include the elimination of regrinding of lumped bagged goods and assistance in keeping fertilizers free-flowing. For prices and delivery

CIRCLE 266 ON SERVICE CARD

How to use the READER SERVICE CARD

- **Circle number of literature you want.**
- **Print or type your name, position, company and address.**
- **Clip and mail the Service Card.**

267—NH_3 Tank & Trailer

KBH corp. has added a new ammonia tank and trailer unit featuring extra convenience, strength and safety. The open side of the tank fitting safety shield permits access to all fittings from ground level. Low to ground construction with king pin and tank strap assemblies reduce danger of upsetting or placement of excessive strain on the tank. For complete information

CIRCLE 267 ON SERVICE CARD

268—Mobile Power Shovel

Clark Equipment's Bulk Master is a small, mobile power shovel with an outside turning radius of only 73 inches. The unit has a capacity of 11 cubic feet or 1,200 pounds, full shovel lifting speed of three seconds, dumping speed of one second and lowering speed of three seconds. It is powered by a four cylinder Continental gas engine with two speeds in forward and reverse. For more information

CIRCLE 268 ON SERVICE CARD

269—Penite 6X

Use Pennsalt Penite 6x for potato top killing, weed or termite control, debarking and tree and stump killing. The highly concentrated arsenite solution contains not less than 54.5 per cent arsenic trioxide equivalent to 71.5 per cent sodium arsenite. Readily mixed in water, it comes in five and 30 gallon containers. For a bulletin

CIRCLE 269 ON SERVICE CARD

270—Ammonia Tanks

Pressed Steel Tank co. has Hackney field supply and service tanks in sizes from 200 to 1,000 gallons and applicator units containing up to 250 gallons. Bulk storage units are also available. All have 250 psi working pressure and all welds are X-ray controlled. Further specifications are available.

CIRCLE 270 ON SERVICE CARD

271—High Speed Bag Closing

A wide variety of high speed bag closing equipment is produced by Union Special Machine for closing all sizes and kinds of units. Models are available for any production requirements. For a bulletin describing the company's filled bag closing machines

CIRCLE 271 ON SERVICE CARD

272—High Conc. Pyrethrum

A high concentrate of pyrethrum is available on an economical basis for the first time in a Pyronyl dust concentrate from Prentiss Drug & Chemical. This is a money saving and effective dust base incorporating pyrethrum with piperonyl butoxide for the insecticide manufacturer with truck crop and home garden products. Send for technical literature.

CIRCLE 272 ON SERVICE CARD

273—Auger Bag Packer

A new multiple action augermatic bag packer has been released by E. D. Coddington. The unit eliminates need for pre-weighing and features a scale redesigned to include a shaker which prevents slack filled bags and permits use of minimum size units. It can be mounted on casters and has a security clamp which holds the valve bag in place regardless of force with which material flows from filling spout. For data

CIRCLE 273 ON SERVICE CARD

274—Cotton Pugs

Cotton pugs (bugs) can be licked with aldrin and dieldrin, according to a recent Shell Chemical booklet showing how these pesticides are used in controlling weevils, bollworms and other insects. The attractive dealer help also includes a brief description of major cotton pests.

CIRCLE 274 ON SERVICE CARD

275—Ammonia Book

Spencer Chemical has released a 50 page book on the technical aspects of handling ammonia, its physical properties and allied topics. It is well illustrated, includes a discussion of ammonia uses in fertilizers and chemicals, in addition to 12 pages of charted data. It is intended for technical needs of industrial users.

CIRCLE 275 ON SERVICE CARD

276—Micronizer

Complete information is available on the Sturtevant Micronizer grinding machine. Now available for outright sale, the unit grinds insecticides to any size specifications and is quickly and easily cleaned on changes of formulation with a minimum loss of material. It is available as a machine alone or as a complete grouping with premix, grinding and bagging equipment.

CIRCLE 276 ON SERVICE CARD

277—Seed Treatments

Diamond Alkali features lindane as an economical seed treatment for winter wheat. The 25 and 75 per cent wettable powders control wireworms and false wireworms and are termed the most economical and effective seed treatment for these pests. When applied to wheat to be seeded, one ounce actual lindane per acre does the job. Formulators can obtain prices, delivery and technical information.

CIRCLE 277 ON SERVICE CARD

278—Rotary Batch Mixer

The multiple blending action of a Munson rotary batch mixer will not stratify ingredients or alter characteristics of basic components. Available in capacities of 40 to 200 cubic feet, the mixer can be fitted with internal spray for introduction of a limited amount of liquid. Features include low horsepower requirements and operating costs. For full information

CIRCLE 278 ON SERVICE CARD

279—Soil Pesticide Carriers

Granular grades of pesticide carriers have been developed by Attapulgus Mineral & Chemicals especially for use in formulating materials for soil pest control. Excellent coverage is obtained with ground or air application and a particle size range is available for all formulations. For a data sheet

CIRCLE 279 ON SERVICE CARD

280—Combination Chain

A catalog sheet is available describing the new Beaumont Birch Dura-Tred Beaucolloy steel combination chain. Included is information on construction features, operation and application. Designed for use with Trac-Pull wheels, it is used on all types of bucket elevators or bulk materials conveyors. Metal on the wearing tread of the link is better than tripled. For a copy

CIRCLE 280 ON SERVICE CARD

281—Engineering Services

Services of Foster D. Snell's Engineering div. are described in a recently issued 12 page booklet. The group does new product research, process development, equipment design, plant operation, trouble shooting, cost analysis and provides advisory services on technical and economic problems. To obtain a copy of the illustrated booklet

CIRCLE 281 ON SERVICE CARD

282—For High Analysis

Meet the demand for high analysis mixed fertilizers with Davison Chemical's triple superphosphate. The material has 45–46 per cent available P_2O_5 and is supplied in easy to use granulated form or run-of-pile. For complete information

CIRCLE 282 ON SERVICE CARD

How to use the

READER SERVICE CARD

- **Circle number of literature you want.**
- **Print or type your name, position, company and address.**
- **Clip and mail the Service Card.**

283—Reduce Caking

Addition of 25 pounds of Minco per ton of fertilizer will produce a cooler and softer stockpile, says Minco Products. This material eliminates caking after crushing and bagging and prohibits addition of moisture, while acting as a coating and parting agent. Also of value in developing granular mixes. Fertilizer manufacturers interested in a sample can

CIRCLE 283 ON SERVICE CARD

284—Fly Flakes

John Powell & co. is now setting up a Fly Flakes sales distribution system covering all of the U. S. except the southeast. This product, manufactured by Florida Agr. Supply, is available in five, 10 and 25 pound containers and, scattered by hand, retains its killing power for days. The material also kills both maggots and DDT-resistant flies. If Fly Flakes are not available in your area

CIRCLE 284 ON SERVICE CARD

285—Butler Tanks

Butler Manufacturing now offers a complete line of small horizontal and skid tanks for storage of liquid nitrogen solutions. Horizontal units are available in sizes from 100 to 1,000 gallons and 500, 830 and 1,000 gallon units can be factory equipped with skids. For full information

CIRCLE 285 ON SERVICE CARD

286—Double Diffusion

A USDA Forest Service booklet on treating fence posts by double diffusion is being offered by Mutual Chemical. Sodium chromate and copper sulfate are the chemicals used and the method is termed simple, effective and economical. For a free copy

CIRCLE 286 ON SERVICE CARD

287—Auto Scale Controls

A technical reference from Richardson Scale briefly describes the operation of indicating and recording systems for use with standard Richardson scales. One section discusses such features as time delay before full-balance printing, partial draft printing and provisions for recording time and date.

CIRCLE 287 ON SERVICE CARD

288—Stainless Steel

Making the most of stainless steels in the chemical process industry is the title of a new booklet from Crucible Steel. The publication describes particularly valuable characteristics and includes a chart on laboratory corrosion data and supplementary text. In addition there is information on Rezistal stainless steel and service facilities available to industry.

CIRCLE 288 ON SERVICE CARD

289—Pneumatic Controls

Fischer & Porter stack-type pneumatic controllers for process variables are illustrated in a recent catalog which is illustrated with cut-away construction photos. Included are specifications, controller response actions and a selection guide. For a copy

CIRCLE 289 ON SERVICE CARD

290—Larvacide Fumigation

A two color brochure on fumigating with Larvacide and aerosol Larvacide has been released. It describes applications in grain and warehouse fumigation for control of insects and rodents. Of special interest is information relating to the new aerosol form.

CIRCLE 290 ON SERVICE CARD

291—Non Sifting Sleeve

The Ful-Flex non-sifting sleeve engineerred by Fulton Bag & Cotton Mills can reduce sifting of your packages. It forms a tighter seal, seats securely and is available at regular prices. For information

CIRCLE 291 ON SERVICE CARD

Buyers' Guide

Classified Index to Advertisers in 'Farm Chemicals'

ALDRIN

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.
Shell Chemical Co., Agr. Chem. Div., Denver, Colo.

AMMONIA—Anhydrous and Liquor

Commercial Solvents Corporation, New York City
Grand River Chem. Div., Deere & Co., Tulsa, Okla.
Lion Oil Co., El Dorado, Ark.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

AMMONIA APPLICATORS

KBH Corp., Clarksdale, Miss.

AMMONIUM NITRATE

Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corporation, New York City
Lion Oil Co., El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

AMMONIUM PHOSPHATE

Monsanto Chem. Co., St. Louis, Mo.

AMMONIUM SULFATE

See Sulfate of Ammonia

AMMONIUM SULFATE NITRATE

Baker & Bro., H. J., New York City

BAGS—Multiwall-Paper

Chase Bag Co., Chicago
International Paper Co., Bagpak Div., N. Y. C.
Hammond Bag & Paper Co., Wellsburg, W. Va.
Hudson Pulp & Paper Corp., N. Y. C.
Kraft Bag Corporation, New York City
Union Bag & Paper Corp., New York City

BAGS—Dealers and Brokers

Ashcraft-Wilkinson Co., Atlanta, Ga.
McIver & Son, Alex. M., Charleston, S. C.

BAG CLOSING MACHINES

International Paper Co., Bagpak Div., N. Y. C.

BAG PRINTING MACHINES

Schmutz Mfg., Louisville, Ky.

BAG FILLING MACHINES

Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

BHC AND LINDANE

Ashcraft-Wilkinson Co., Atlanta, Ga.,
Diamond Alkali Co., Newark, N. J.
Pennsylvannja Salt Mfg. Co., of Wash., Tacoma, Wash.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div. Pittsburgh, Pa.

BONE PRODUCTS

American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

BORAX AND BORIC ACID

Woodward & Dickerson, Inc., Philadelphia, Pa.

BROKERS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

BUCKETS—Hoist, Crane, etc.

Hayward Company, The, New York City

CALCIUM ARSENATE

American Agricultural Chemical Co., N. Y. C.

CARS AND CART

Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

CASTOR POMACE

Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
McIver & Son, Alex. M., Charleston, S. C.

CHEMISTS AND ASSAYERS

Shuey & Co., Inc., Savannah, Ga.
Wiley & Company, Baltimore, Md.

CHLORDANE

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

CLAY

Ashcraft-Wilkinson Co., Atlanta, Ga.

CONDITIONERS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
National Lime & Stone Co., Findlay, Ohio

CONVEYORS

Power-Curve Conveyor Co., Denver, Colo.
Link-Belt Co., Chicago, Ill.

COPPER SULFATE

Republic Chem cal Corp., New York City
Tennessee Corp., Atlanta, Ga.

COTTONSEED PRODUCTS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa

DDT

Ashcraft-Wilkinson Co., Atlanta, Ga.
Diamond Alkali Co., Newark, N. J.
Michigan Chemical Corp., St. Louis, Mich.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

DIELDRIN

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.
Shell Chem. Corp., Agr. Chem. Div., Denver, Colo.

DILUENTS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Calcium Carbonate Co., Chicago, Ill.
Pioneer Pyrophyllite Producers, Beverly Hills, Calif.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.
Summit Mining Corporation, Carlisle, Pa.
Thomas Alabama Kaolin Co., Baltimore, Md.

DITHIOCARBAMATES

Berkshire Chemicals, New York City

ELEVATORS

Power-Curve Conveyor Co., Denver, Colo.
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.

ENGINEERS—Chemical and Industrial

Chemical Construction Corp., New York City
Fairlie, Inc., Andrew M., New York City
General Industrial Development Corp., N. Y. C.
Marietta Concrete Corporation, Marietta, Ohio
Stedman Foundry and Machine Co., Aurora, Ind.
Titlestad Corporation, Nicolay, New York City

FERTILIZER—Mixed

American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Davison Chemical Co., div. of W. R. Grace & Co., Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.

FILLERS

Bradley & Baker, N. Y. C.

FISH SCRAP AND OIL

Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

FULLER'S EARTH

Ashcraft-Wilkinson Co., Atlanta, Ga.

FUNGICIDES

American Agricultural Chemical Co., N. Y. C.
Berkshire Chemicals, New York City
Pittsburgh Coke & Chemical Co., Agr. Chem. Div. Pittsburgh, Pa.
Republic Chemical Corp., New York City
Tennessee Corp., Atlanta, Ga.

HERBICIDES

Diamond Alkali Co., Newark, N. J.
Lion Oil Company, El Dorado, Ark.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div. Pittsburgh, Pa.

HERBICIDES—Oils

Lion Oil Company, El Dorado, Ark.

HOPPERS & SPOUTS

Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

IMPORTERS, EXPORTERS

Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Berkshire Chemicals, New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

INSECTICIDES

American Agricultural Chemical Co., N. Y. C.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Berkshire Chemicals, New York City
Diamond Alkali Co., Newark, N. J.
Fairfield Chem. Div., Food Mach. & Chem. Corp., New York City
Michigan Chemical Corp., St. Louis, Mich.
Pennsylvanna Salt Mfg. Co., of Wash, Tacoma, Wash.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div. Pittsburgh, Pa.
Shell Chem. Corp., Agr. Chem. Div., Denver, Colo.
U. S. Industrial Chemicals Co., New York City

IRON SULFATE

Tennessee Corp., Atlanta, Ga.

KAOLIN

Thomas Alabama Kaolin Co., Baltimore, Md.

LEAD ARSENATE

American Agricultural Chemical Co., N. Y. C.

LIMESTONE

American Agricultural Chemical Co., N. Y. C.
Ashcraft-Wilkinson Co., Atlanta, Ga.
National Lime & Stone Co., Findlay, Ohio

Buyers' Guide

MACHINERY—Acid Making and Handling
Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Acidulating
Chemical Construction Corp., New York City

MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, The, East Point, Ga.
Bradley Pulverizer Co., Allentown, Pa.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Material Handling
Atlanta Utility Works, The, East Point, Ga.
Clark Equipt. Co., Construction Mach. Div., Benton Harbor, Mich.
Hayward Company, The, New York City
Hough, The Frank G. Co., Libertyville, Ill.
Lessman Mfg. Co., Des Moines, Ia.
Link-Belt Co., Chicago, Ill.
Poulsen Co., Los Angeles, Calif.
Power-Curve Conveyor Co., Denver, Colo.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Mixing, Screening and Bagging
Atlanta Utility Works, The, East Point, Ga.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Power Transmission
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY
Superphosphate Manufacturing
Atlanta Utility Works, The, East Point, Ga.
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.

MAGNESIUM SULFATE
Berkshire Chemicals, New York City

MANGANESE SULFATE
Tennessee Corp., Atlanta, Ga.

MANURE SALTS
Potash Co. of America, Washington, D. C.

MINOR ELEMENTS
Tennessee Corporation, Atlanta, Ga.

MIXERS
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

NITRATE OF POTASH
Berkshire Chemicals, New York City

NITRATE OF SODA
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
McIver & Son, Alex. M., Charleston, S. C.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
International Min. & Chem. Corp., Chicago, Ill.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NITROGEN SOLUTIONS
Commercial Solvents Corporation, New York City
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Lion Oil Company, El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

NITROGEN MATERIALS—Organic
American Agricultual Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Smith Rowland Co., Norfolk, Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

PARATHION
Ashcraft-Wilkinson Co., Atlanta, Ga.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

PENTACHLOROPHENOL
Monsanto Chemical Co., St. Louis, Mo.

PHOSPHATE ROCK
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

PHOSPHORIC ACID
American Agricultural Chemical Co., N. Y. C.
Monsanto Chemical Co., St. Louis, Mo.

PLANT CONSTRUCTION—Fertilizer and Acid
Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
General Industrial Development Corp., N. Y. C.
Link-Belt Co., Chicago, Ill.
Monsanto Chemical Co., St. Louis, Mo.
Stedman Foundry and Machine Co., Aurora, Ind.
Titlestad Corporation Nicolay, New York City

POTASH—Muriate
American Potash & Chemical Corp., N. Y. C.
Ashcraft-Wilkinson Co., (Duval Potash) Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Duval Sulphur & Potash Co., Houston, Tex.
International Min. & Chem. Corp., Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Potash Co. of America, Washington, D. C.
Southwest Potash Corporation, New York City
United States Potash Co., N. Y. C.

POTASH—Sulfate
American Potash & Chemical Corp., N. Y. C.
Baker & Bro., H. J., New York City
International Min. & Chem. Corp., Chicago, Ill.
Potash Co. of America, Washington, D. C.

POTASSIUM PHOSPHATE
Monsanto Chemical Co., St. Louis, Mo.

PRINTING PRESSES—Bag
Schmutz Mfg. Co., Louisville, Ky.

PYROPHYLLITE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pioneer Pyrophyllite Producers, Beverly Hills, Calif.

REPAIR PARTS AND CASTINGS
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

SCALES—Including Automatic Baggers
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

SCREENS
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

SPRAYS
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

STORAGE BUILDINGS
Butler Manufacturing Co., Kansas City, Mo.
Marietta Concrete Corporation, Marietta, Ohio

SULFATE OF AMMONIA
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Lion Oil Co., El Dorado, Ark.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Phillips Chemical Co., Bartlesville, Okla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFATE OF POTASH—MAGNESIA
International Min. & Chem. Corp., Chicago, Ill.

SULFUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Texas Gulf Sulphur Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFUR—Dusting & Spraying
Ashcraft-Wilkinson Co., Atlanta, Ga.
U. S. Phosphoric Products Div., Tennessee Corp., Tampa, Fla.

SULFURIC ACID
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Lion Oil Company, El Dorado, Ark.
Monsanto Chemical Co., St. Louis, Mo.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

SUPERPHOSPHATE
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Davison Chemical Co., div. of W. R. Grace & Co., Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TALC
Ashcraft-Wilkinson Co., Atlanta, Ga.

TANKAGE
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Smith-Rowland Co., Norfolk, Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TANKS—NH3
Birmingham Tank Co., Birmingham, Ala.

TEPP
Monsanto Chemical Co., St. Louis, Mo.

TOXAPHENE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr., Chem. Div., Pittsburgh, Pa.

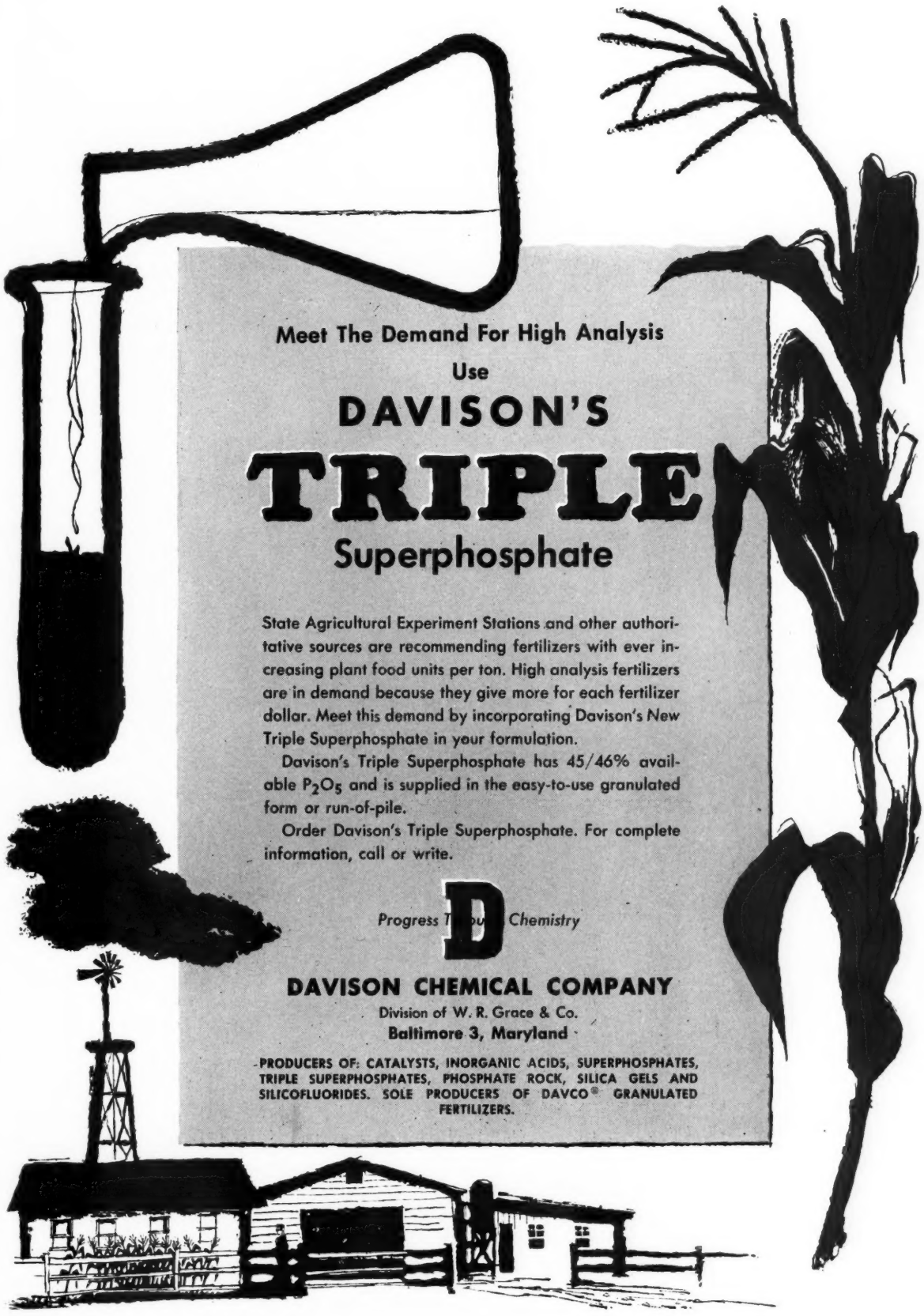
2, 4-D
Diamond Alkali Co., Newark, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem Div., Pittsburgh, Pa.

2, 4, 5-T
Diamond Alkali Co., Newark, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

UREA & UREA PRODUCTS
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Grand River Chem. Div., Deere & Co., Tulsa, Okla.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C

VALVES
Atlanta Utility Works, The, East Point, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

ZINC SULFATE
Tennessee Corp., Atlanta, Ga.



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